NASA SP-7011 (32)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during December, 1966

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. **JANUARY 1967**

INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

a. NASA entries identified by their *STAR* accession numbers (N66-10000 series),
b. AIAA entries identified by their *IAA* accession numbers (A66-10000 series); and
c. LC entries identified by a number in the A66-80000 series.

Many of the abstracts included in this publication have been reproduced from those appearing in *STAR* and *IAA*. This procedure, adopted in the interests of economy and speed, has introduced some variation in size, style, and intensity of type.

AVAILABILITY OF DOCUMENTS

STAR Entries (N66)

NASA documents listed are available without charge to:

1. NASA Offices, Centers, contractors, subcontractors, grantees, and consultants.
2. Other U.S. Government agencies and their contractors.
3. Libraries in the United States that maintain collections of NASA documents for public reference.
4. Other organizations in the United States having a need for NASA documents in work related to the aerospace program.
5. Foreign government or academic (university) organizations that have established reciprocal arrangements for the exchange of publications with NASA, that have current agreements for scientific and technical cooperative activities with NASA, or that have agreements with NASA to maintain collections of NASA documents for public use.

Department of Defense documents (identified by the "AD" number in the citation) are available without charge to U.S. Government-sponsored research and development activities from the Defense Documentation Center (DDC), Cameron Station, Alexandria, Virginia 22314. DoD documents are not available from NASA.

Other non-NASA documents are provided by NASA without charge only to NASA Offices, Centers, contractors, subcontractors, grantees, and consultants. Foreign non-copyrighted documents will be provided to U.S. Government Agencies and their contractors. AGARD reports that are not commercially available will be made available on the same basis as NASA documents.

Documents that have been placed on microfiche are identified with the symbol #. Microfiche are available on the same basis as hard-copy.

The public may purchase the documents listed from either of two sales agencies, as specifically identified in the citations.

Clearinghouse for Federal Scientific
and Technical Information (CFSTI),
Springfield, Virginia 22151

Superintendent of Documents
U.S. Government Printing Office (GPO)
Washington, D.C. 20502

Information on the availability of this publication and other reports covering NASA scientific and technical information may be obtained by writing to:

Scientific and Technical Information Division
National Aeronautics and Space Administration
Code USS-AD
Washington, D.C. 20546

Collections of NASA documents are currently on file in the organizations listed on the inside of the back cover.

(continued)

IAA Entries

All articles listed are available from the American Institute of Aeronautics and Astronautics, Technical Information Service. Individual and Corporate AIAA Members in the United States and Canada may borrow publications without charge. Interlibrary loan privileges are extended to the libraries of government agencies and of academic nonprofit institutions in the United States and Canada. Loan requests may be made by mail, telephone, telegram, or in person. Additional information about lending, photocopying, and reference service will be furnished on request. Address all inquiries to:

Technical Information Service
American Institute of Aeronautics and Astronautics, Inc.
750 Third Avenue, New York 17, New York

For further details please consult the *Introductions* to *STAR* and *IAA*, respectively.

LC Entries

Articles listed are available in the journals in which they appeared. They may be borrowed or consulted in libraries maintaining sets of these journals. In some instances, reprints may be available from the journal offices.

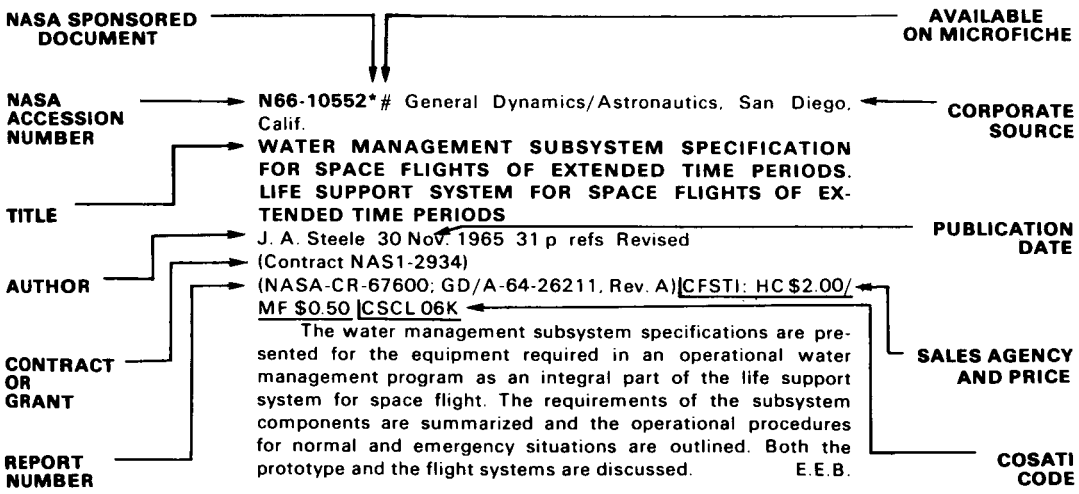
AVAILABILITY OF THIS BIBLIOGRAPHY

Copies of *Aerospace Medicine and Biology* (SP-7011) and its supplements can be obtained from NASA (Code USS-A), without charge, by NASA offices and contractors, U.S. Government agencies and their contractors, and organizations that are working in direct support of NASA programs.

Other organizations can purchase copies of the bibliography from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

TABLE OF CONTENTS

TYPICAL CITATION AND ABSTRACT



AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography JANUARY 1967

STAR ENTRIES

N66-37710# Joint Publications Research Service, Washington, D. C.
BIOLOGICAL EFFECT AND DOSIMETRY OF RADIATION OF RUBY LASER
A. A. Gorodetskiy, B. R. Kirichinskiy, I. R. Yevdokimov, and V. M. Kolesnik *In its* Twenty-Second All-Union Sci Session Devoted to Radio Day. Sect. on Quantum Electron 19 Aug 1966 p 1-2 (See N66-37709 23-10) CFSTI: $3.00

Calorimetric, chemical, and photographic methods were used to measure the absorbed radiation energy of a ruby laser by various tissues (blood, blood plasma, skin, muscle, organs, organisms, and biological media). The effect of dye coloring on the extent of the absorbed energy of the radiation was also studied. The elastic (ultrasonic) oscillations that take place when laser radiations act upon solid bodies, liquids, and different biological media, were investigated by means of a piezoelectric pickup. The ultrasonic pulses had a duration somewhat longer than the duration of the laser pulse. L.S.

N66-37775*# Biosystems, Inc., Cambridge, Mass.
VISUAL AND CONTROL ASPECTS OF SACCADIC EYE MOVEMENTS
Lawrence R. Young, Bert L. Zuber, and Lawrence Stark Washington, NASA, Sep. 1966 143 p refs
(Contract NAS2-1328)
(NASA-CR-564) CFSTI: HC $3.00/MF $1.00 CSCL 06P

The mechanism by which humans move their eyes in rapid saccadic jumps is examined from the physiological, behavioral and control points of view. The anatomy of the extraocular system is reviewed to present the special control problem involved in saccadic eye movements. Behavioral data describing the nonlinear and nonsymmetric characteristics of individual saccadic eye movements are assessed and new experimental data are provided to evaluate the timing of information received by the eye. Experiments were conducted on the effective dead zone of the eye and a simple probabilistic model proposed to describe this dead zone. The question of proprioceptive feedback in the extraocular muscles is considered in some detail. A number of control models for the mechanism of the saccadic eye movements are presented and evaluated. Author

N66-37776*# Biosystems, Inc., Cambridge, Mass.
BIOLOGICAL CONTROL SYSTEMS—A CRITICAL REVIEW AND EVALUATION
Lawrence Stark, Lawrence R. Young, Robert Taub, Arthur Taub, and Peter G. Katona Washington, NASA, Sep. 1966 395 p refs
(Contracts NAS2-2122; NAS2-1372)
(NASA-CR-577) CFSTI: HC $4.25/MF $2.00 CSCL 06P

A comprehensive review and evaluation is presented of research on biological control systems, with emphasis on the methods of investigation and the state of models proposed for a variety of systems. The contribution of control theory to understanding complex biological feedback systems is stressed, and the limitations of both mathematical tools and instrumentation are considered. The pupil, lens, vestibular, cardiovascular, fluid volume control, and skin systems received major attention. C.T.C.

N66-37799# Royal Aricraft Establishment, Farnborough (England).
ELECTRICAL PARAMETERS OF THE MEMBRANE OF AMOEBA PROTEUS. PART II: MOVING AMOEBAE [ELEKTRICHESKIE PARAMETRY MEMBRANY AMOEBA PROTEUS.
I. V. Batuyeva Jun. 1966 19 p refs Transl. into ENGLISH from Tsitologiya (Leningrad), v. 7, no. 4, 1965 p 553-561
(RAE-LIB-TRANS-1170; PT. II) CFSTI: HC $1.00/MF $0.50

Membrane electrical properties of the moving Amoeba proteus have been investigated. Resting potential and membrane electrical parameters (specific resistance and capacity) of moving amoeba were shown to be the same as those of motionless animals. No correlation between the electrical phenomena and the cytoplasm movement has been found. Author

N66-37825*# Stanford Univ., Calif. Instrumentation Research Lab.
A THEORY FOR MOLECULAR TRANSPORT PHENOMENA THROUGH THIN MEMBRANES
Jerry Eugene Lundstrom May 1965 79 p refs
(Grant NsG-81-60)
(NASA-CR-67926; IRL-1034) CFSTI: HC $5.00/MF $0.75 CSCL 06A

A relationship is derived to describe transport phenomena which is more general than the traditional description. The increased generality is achieved by accounting for both the surface and diffusion processes in determining the solute concentrations at the surfaces of the membrane. The application of this relationship to thin membrand and/or tenacious solute-membrane interaction systems is described. An approach to the general problem of molecular transport through membranes is defined, and some attention is given to the experimental problem of determining the fundamental parameters of a given system. A.G.O.

N66-37836# Naval Radiological Defense Lab., San Francisco, Calif.

COLONY-FORMING UNIT REPOPULATION AND SPLIT-DOSE RADIOSENSITIVITY IN ENDOTOXIN TREATED AND CONTROL LAF$_1$ MICE

Gerald E. Hanks and E. John Ainsworth 5 Aug. 1966 26 p refs

(USNRDL-TR-1024; AD-635600) CFSTI: HC $1.00/MF $0.50

Radiosensitivity of an animal, in terms of survival or death following midlethal exposure, is thought to be related to the surviving number of hematopoietic stem cells. After a sublethal exposure to radiation an animal's sensitivity to a subsequent exposure (LD_{50}) might also be expected to be related to the number of stem cells which are present at any given time. In the present experiments with mice, the relationship was studied between split-dose LD_{50} and changes in the numbers of nucleated cells in the femur and the femoral content of colony-forming units (CFU'S). These CFU's are proliferative cells in the marrow which when transplanted have the capacity to form nodules in the spleens of supralethally irradiated recipient mice. Many stem cell-like attributes have been conferred to CFU's and the CFU is frequently referred to as a hematopoietic stem cell. Changes in marrow cellularity and CFU content were studied for three weeks after exposure to 450 R, and preliminary LD_{50}'s were determined at 5 or 14 days. One group of animals was given bacterial endotoxin before the 450 R exposure. During the first week after 450 R, the endotoxin-treated animals showed an accelerated recovery in terms of numbers of nucleated marrow cells and CFU's, and at day 5 the femoral CFU content of the endotoxin-treated animals was ten times as great as that of the controls. Author (TAB)

N66-37862# Naval Radiological Defense Lab., San Francisco, Calif.

STUDIES ON THE RADIOSENSITIVE PHASE OF THE PRIMARY ANTIBODY RESPONSE. II: THE EFFECT OF MACROPHAGES FROM IRRADIATED DONORS ON ABILITY TO TRANSFER ANTIBODY FORMATION

James F. Pribnow and Myron S. Silverman 25 Jul. 1966 20 p refs

(USNRDL-TR-1029; AD-635598) CFSTI: HC $1.00/MF $0.50

Peritoneal exudate cells were harvested from rabbits which had received 450, 550, or 750 R X-irradiation twenty-four hours previously. After incubation with bovine gamma globulin these cells were injected into normal rabbits. When donors had received 750 R, no antibody response was elicited in the recipients. The response to sensitized irradiated macrophages which had received 450 or 550 R was varied. In no case did the degree of antibody response appear to depend on the number of sensitized cells injected. Irradiated recipients receiving sensitized irradiated macrophages (550 R) together with lymph node cells from normal rabbits were unable to form antibody. The implications of these finding in relation to the radiosensitive phase of the antibody response are discussed. Author (TAB)

N66-37864# Rochester Univ., N. Y.

THE DEVELOPMENT OF A MOOD ADJECTIVE CHECK LIST (MACL) Final Report

Vincent Nowlis Jan. 1966 10 p refs

(Contract Nonr-668(12))

(AD-635460) CFSTI: HC $1.00/MF $0.50

A Mood Adjective Check List (MACL) was developed on the basis of factor analytic methods, which yielded twelve hypothetical dimensions of mood. Mood scores and changes in mood score were studied in relation to such environmental and psychological features as stressful motion picture films and communications, examinations, other films, social isolation, amount and quality of sleep, temperament traits, and sex differences. The usefulness and limitations of the MACL and of the concept of mood are discussed. Author (TAB)

N66-37894*# Miami Univ., Coral Gables, Fla. Inst. for Molecular Evolution.

SIMULATION OF ORGANISMIC MORPHOLOGY AND BEHAVIOR BY SYNTHETIC POLY-α-AMINO ACIDS

Sidney W. Fox, Robert Mc Cauley, David Joseph, Charles Ray Windsor, and Shuhei Yuyama [1965] 14 p refs Prepared jointly with Fla. State Univ.

(Grant NsG-689)

(NASA-CR-78435) CFSTI: HC $1.00/MF $0.50 CSCL 06A

Experiments imitating spontaneous geothermal occurrences have yielded most of the amino acids found in protein. All of the amino acids found in protein are simultaneously condensed, by heating in a range of appropriate conditions, to polymers which have many of the properties of proteins. These properties include molecular weights of many thousand, digestibility by proteolytic enzymes, and catalytic activities. One of the other properties is the tendency to form structured units; these units have many of the attributes of biocells. The processes indicated, and others, comprise a conceptual continuum which, according to accumulated information, must have occurred under the conditions existing in regions of the primitive earth. Author

N66-38004# Societe Ricerche Impianti Nucleari, Saluggia (Italy). *Centro Ricerche Nucleari.*

TECHNICAL AND ORGANIZATIONAL PROBLEMS IN THE PRODUCTION OF RADIOISOTOPES AT THE SORIN NUCLEAR RESEARCH CENTER IN SALUGGIA [PROBLEMI TECNICI ED ORGANIZZATIVI NELLA PRODUZIONE DI RADIOISOTOPI PRESSO IL CENTRO RICERCHE NUCLEARI SORIN A SALUGGIA]

U. Rosa 1966 15 p In ITALIAN Presented at the 11th Nucl. Congr. of Rome, 23–25 Jun. 1966

(SORIN-91) CFSTI: HC $1.00/MF $0.50

Technical production problems, and the application to industry and biological medicine of the nuclear research work conducted in Italy are discussed in general terms. Tabular data list the mC quantity of the principal isotopes (iodine 131, iodine 125, phosphorus 32, gold 198, mercury 203, mercury 197, chromium 51, sodium 24, and potassium 42) handled annually in the Saluggia Center, and the percentage of the production of labelled compounds (radioisotopes of iodine, chromium, phosphorus, and mercury) which are exported to foreign research centers. Graphs show the electrolytic cell for labelling radioactive iodine, as well as the electrolytic cell for separating sodium 24, produced by a magnesium 24 (n,p) sodium 24 reaction, from the irradiated magnesium matrixes. Transl. by R.LI.

N66-38080# Tennessee Univ., Oak Ridge. Agricultural Research Lab.

[RESEARCH ACTIVITIES] Semiannual Progress Report, 1 Jul. –31 Dec. 1965

Washington, AEC, May 1966 179 p refs

(Contract AT(40-1)-GEN-242)

(ORO-648) CFSTI: HC $5.00/MF $1.00

Progress is reported on work in veterinary medicine, reproductive physiology, radiation pathology, physiological effects of radiations, large animal nutrition, dairy nutrition, poultry nutrition, fission product chemistry of soils, and radiobotany. Separate abstracts were prepared for each of the nine sections. NSA

N66-38081# Oak Ridge National Lab., Tenn.

HEALTH AND PHYSICAL SAFETY Annual Report, 1965

Jul. 1966 93 p refs
(Contract W-7405-ENG-26)
(ORNL-3969) CFSTI: HC $3.00/MF $0.75

The gaseous and liquid waste releases from the Laboratory were such that the concentration of radioactive materials in the environs was well below the maximum levels recommended by the National Committee on Radiation (NCRP) and Federal Radiation Council (FRC). The average concentration of radioactive materials in the atmosphere at the X-10 site was less than 1% of the maximum permissible for persons residing in the neighborhood of an atomic installation, and the concentration was, as expected, even less at the perimeter of the controlled area. The calculated average concentration of radioactive materials in the Clinch River at the point of entry of White Oak Creek into the River was also less than 1% of the maximum permissible for persons residing in the neighborhood of an atomic energy installation. No employee received an external or internal radiation dose which exceeded the maximum permissible levels recommended by the FRC. The highest whole body dose equilvalent received by an employee was about 4.4 rem or 37% of the maximum permissible annual dose. No employee has a cumulative whole body dose which exceeds the recommended maximum permissible dose as based on the age proration formula 5(N-18). There were no cases of internal exposure where the deposition of radioactive materials within the body was estimated to have averaged greater than one-half of a maximum permissible body burden. During 1965, there were 41 unusual occurrences recorded, which is the second lowest number recorded since the present system of reporting unusual occurrences was established in 1960. The 41 occurrences is an increase of 42% over the 29 reported for 1964, the lowest number per year which has been reported, but is about 17% below the five-year average for the year 1961 through 1965. The Laboratory reported 17 disabling injuries during 1965, which was a frequency rate of 2.2. The total number for the past five years (1961-1965) was 56 or an average frequency rate of 1.5. Author (NSA)

N66-38102# School of Aerospace Medicine, Brooks AFB, Tex.

A SIMPLIFIED TEST TUBE METHOD FOR THE ANALYSIS OF TOTAL CHOLESTEROL AND GYCERIDES IN HUMAN SERUM

Dorothy F. Wease, Harry H. Malvin, and Eli S. Espinosa Jun. 1966 16 p refs
(SAM-TR-66-53; AD-636734) CFSTI: HC $1.00/MF $0.50

A relatively simple and rapid procedure for the preferential extraction of total cholesterol and glycerides from serum is presented. Techniques for quantitative assay of these lipids are included. This extraction-separation method eliminates the separate steps ordinarily required in the extraction of lipids and the removal of phospholipids from the extract. The clear extract is obtained without filtration or centrifugation. This technique is suitable for processing a large number of specimens per day and is also practical for use in a small clinical laboratory.
Author (TAB)

N66-38112# Federal Aviation Agency, Oklahoma City, Okla.

THE PREDOMINANT CAUSES OF CRASHES AND RECOMMENDED THERAPY

Stanley R. Mohler Apr. 1966 8 p refs
(AM-66-8)

Close scrutiny of the causes of recent general-aviation fatal crashes reveals that there is a wide discrepancy between the accident rate and the actual risk of flying. A large percentage of accidents occur through horseplay, foolishness and lack of respect for nature. An increased awareness of the state of one's body while flying, enhanced training, and attitude inculcation can do much to lower the accident rate. Pilots should be instructed to avoid flight while suffering from emotional distress or the effects of alcohol consumption or during deteriorating weather conditions. Author

N66-38116*# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

A TECHNIQUE TO INVESTIGATE SPACE MAINTENANCE TASKS

Jerome S. Seeman, Francis H. Smith (NASA, Marshall Space Flight Center), and Donald D. Mueller Apr. 1966 22 p ref
Prepared jointly with NASA, Marshall Space Flight Center
(NASA Order T-18811-G)
(NASA-CR-78433; AMRL-TR-66-32) CFSTI: HC $1.00/MF $0.50
CSCL 05H

A series of preliminary studies was performed to determine if a high-fidelity ground-based simulation of zero gravity is necssary to obtain valid information about zero-G maintenance performance. Removal and replacement of a prestart solenoid value on a rocket engine was selected as the basic maintenance task to be studied. Time scores for laboratory performance of the task were compared with scores obtained from subjects operating on the task during periods of transient weightlessness in a KC-135 aircraft. Modified hand tools, a tool box, and a worker tethering system were developed for use in the experiment. Major conclusions were (1) the factor contributing most to performance decrement in space maintenance was space-suit pressurization level; (2) in this study, the effect of weightlessness on performance was less than the effect of suit pressure level, and, in this instance, it would not have been necessary to introduce zero-G conditions to conduct a meaningful study of space maintenance performance. Author

N66-38117# Naval Radiological Defense Lab., San Francisco, Calif.

RADIATION-PROTECTION AND RECOVERY FROM RADIATION INJURY IN ENDOTOXIN-TREATED MICE. HEMATOPOIETIC RECOVERY AND SENSITIVITY TO A SECOND RADIATION EXPOSURE

E. John Ainsworth, Kathleen Kendall, F. A. Mitchell, and Theodore L. Phillips 23 May 1966 47 p refs
(USNRDL-TR-1023; AD-636209) CFSTI: HC $2.00/MF $0.50

The radioprotective effects of endotoxins and the relationship between hematopoietic recovery and the rate at which the mouse returns toward a normal radiosensitivity after a conditioning exposure were evaluated. Both pseudomonas polysaccharide (PP) and typhoid-paratyphoid vaccine (TAB) increased survival of irradiated mice, and the protective effect differed in two strains of mice. The protective effects of PP and hypoxia were additive and the composite protection ratio was 1.87. The TAB was used in an attempt to accelerate hematopoietic recovery in sublethally irradiated mice. Although the numbers of circulating and mobilizable granulocytes were greater in TAB-treated animals than in controls during the second post-irradiation week, the TAB-treated animals did not show a more rapid recovery from radiation injury as evaluated by the split-dose technique. The numbers of circulating granulocytes may be of value in predicting the outcome of a radiation episode in terms of survival or death, but the number of granulocytes does not necessarily predict sensitivity to a second radiation exposure. Author (TAB)

N66-38129# Library of Congress, Washington, D. C. Aerospace Technology Div.

SOVIET BIOTECHNOLOGY AND BIOASTRONAUTICS Surveys of Foreign Scientific and Technical Literature, 30 Jun.-31 Dec. 1965

Christopher H. Dodge 15 Jun. 1966 169 p refs Compilation of abstracts
(ATD-66-75)

This compilation of abstracts is based on Soviet-Satellite-Western open sources published in 1965. The third in a series, this report reflects Soviet research in the fields of

bioastronautics, space biology, and space-oriented biotechnology published during the last three quarters of 1965. There are 93 entries in the form of indicative abstracts, expanded abstracts, and analytical reviews designed to present as much quantitative data as is permissible within the limitation of the abstracting format. These entries have been arranged in nine parts according to subject area: Part I. Biomedical effects of altered gravity (10 entries); Part II. Biological effects of vibration and ultrasound (5 entries); Part III. Radiation effects, dosimetry, and technology (23 entries); Part IV. Biological effects of radio frequency and magnetic fields (10 entires); Part V. Effects of altered gas environments (10 entries); Part VI. Effects of combined spaceflight factors (12 entries); Part VII. Life support systems (7 entries); Part IX. Biomedical monitoring, biotelemetry, and biotechnology (9 entries). The first page of each part contains a list of the entries by number, title, and page title, page number. Not included in this reportis material from PKB-4 ("Problems of Space Biology", v. 4, 1965). However, Appendix No. 1 gives the table of contents of this volume. Also included in the report are an alphabetical author index and an alphabetical subject index. There is no bibliography. Author

N66-38150# Illinois Univ., Urbana. Dept. of Psychology.
THE PREDICTION OF PERCEPTUAL-MOTOR LEARNING FROM INDEPENDENT VERBAL AND MOTOR MEASURES
David L. Kohfeld (M.S. Thesis) Apr. 1966 37 p refs
(Contract Nonr-1834(39))
(AD-635865) CFSTI: HC $2.00/MF $0.50

Forty human S's were administered independent motor and verbal pretests and were then given learning trials on a criterion task which required both motor and verbal skills. The pretests were employed as predictors to determine the relationship of verbal and motor abilities to various stages of perceptual-motor performance. The results suggest that verbal comprehension is more important early in perceptual-motor motor learning while motor skill is more critical in later learning. Author (TAB)

N66-38155# Joint Publication Research Service, Washington, D. C.
VARIABILITY OF BACILIUS ANTHRACIS IN NATURAL CONDITIONS
I. N. Presnov 19 Sep. 1966 17 p Transl. into ENGLISH from Veterinariya (Moscow), v. 43, no. 7, Jul. 1966 p 25–29
(JPRS-37689; TT-66-34117) CFSTI: $1.00

Bacteriological investigations of animal burying grounds were conducted to determine anthrax bacillus variability and the retention of its virulent properties during survival in the soil. The collection and processing of test samples is described, and the bacillus strains isolated from the soil are considered. Thirteen strains varying in virulence were obtained, and these were divided into five groups according to their properties: (1) capsule-forming virulent, (2) capsule-forming weakly virulent, (3) avirulent capsule-forming in vitro, (4) noncapsular with residue virulence, and (5) avirulent. It is concluded that the anthrax causative agent is surviving in the burying grounds of animals which died from the disease 50 years ago. The investigations established a wide range of variability in the strains isolated from the soil, with some that have completely lost their virulent properties, but retained the indices which are characteristic of the anthrax causative A.G.O.

N66-38160# Joint Publications Research Service, Washington, D. C.
NITROUS EXCHANGE IN THE BRAIN OF RATS DURING ACTION OF PULSE ACCELERATIONS
Z. S. Gershenovich, A. Z. Gershenovich, L. A. Odnokrylaya, E. Z. Emirbekov, and Ya. I. Veksler 19 Sep. 1966 8 p Transl. into ENGLISH from Voprosy Med. Khim. (Moscow), v. 13, no. 3, 1966 p 262
(JPRS-37687; TT-66-34115) CFSTI: $1.00

Consideration is given to the effect of pluse accelerations upon the metabolic processes of animal brains. Relative to this, determinations are made of the concentration of free ammonia, glutamine, glutamic acid, aspartic acid, and gamma-aminobutyric acid. Also determined are the quantity of labile and firmly combined amide groups of total proteins, immediately and three hours after the action of acceleration impulses. C.T.C.

N66-38161# Joint Publications Research Service, Washington, D. C.
CYBERNETICS AND THE INTEGRATIVE ACTIVITY OF THE BRAIN
P. K. Anokhin 19 Sep. 1966 36 p Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 3, 1966 p 10–32 Presented at the 18th Intern. Psychological Congr., Moscow
(JPRS-37716; TT-66-34144) CFSTI: $2.00

A simulation study is presented of the brain in which the model can facilitate purposeful analyses of any mechanism, treat behavioral acts as integrative reflections, and can formulate new investigative work. This neurophysiological model incorporates two basic requirements: (1) it is based on actual results of modern neurophysiology, and (2) the cybernetic structure is such that more accurate analytic results, produced in the study of any particular mechanisms, can be inserted. The model uses the investigations of neurophysiological conditions, and clearly defines the particular location which each of these investigations occupies in the architecture of behavioral acts. C.T.C.

N66-38164# Joint Publications Research Service, Washington, D. C.
MACHINE PENETRATES INTO THE SECRETS OF THE BRAIN
E. T. Holovan', V. S. Starynets', and K. O. Ivanov-Muroms'kyy 29 Sep. 1966 92 p refs Transl. into ENGLISH of the book "Mashyna Pronykaye v Tayemnytsi Mozku" Kiev, "Naukova Dumka" Publishing House, 1965 p 1–128
(JPRS-37899; TT-66-34327) CFSTI: $3.00

A study is presented of the modeling of human emotions on electronic computers. A brief description is given of the various areas of the brain, and the normal functions of each area are outlined. Topics considered include unusual interrogation, the necessity of feelings, physiological models of neurosis, the depth of emotions, vocabulary models, and "satisfaction" and "dissatisfaction" centers. C.T.C.

N66-38167# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CARDIOVASCULAR EFFECTS OF MILD SURFACE COOLING Final Technical Report, Nov. 1964–Mar. 1965
Eugene Evonuk May 1966 16 p refs Submitted for Publication
(AAL-TR-66-1; AD-636475) CFSTI: HC $1.00/MF $0.50

The cardiovascular effects in normothermic dogs cross-circulated with mildly hypothermic dogs were studied in animals that were warm and cold acclimatized. By this technique it was possible to physiologically dissect the neural responses from the humoral or metabolic factors involved. The cardiac output, limb blood flow, arterial pressure and heart rate were measured in normothermic dogs at the time of each 0.5°C drop in rectal temperature of dogs that were rendered mildly hypothermic by surface cooling, and at each 0.5°C increase in rectal temperature during rewarming. Acute surface cooling of warm-acclimatized dogs liberated specific metabolites and/or neurohumors that had a profound cardiovascular effect on cross-circulated normothermic dogs. In similar experiments on cold acclimatized animals, this effect was not observed. It was concluded that cold acclimatiza-

tion depleted or shifted the cardiovascular threshold response to these metabolites and/or neurohumors. Author (TAB)

N66-38168# Uppsala Univ. (Sweden). Gustaf Werner Inst.
CROSS SECTION FOR THE PRODUCTION OF 30P FROM 31P BY PROTONS OF ENERGIES BELOW 190 MeV
P. Malmborg Dec. 1964 26 p refs
(Contract AF 61(052)740)
(SR-3; AD-636647) CFSTI: HC $2.00/MF $0.50

The excitation function for the production of 30P from 31P by protons between 20 and 190 MeV has been measured. The sum of the cross sections of the reactions leading to the production of 30P from 31P was found to rise from threshold to a maximum of 50 to 100 millibarns between 15 and 50 MeV. At higher energies there was a continuous decrease to (32 ± 5) millibarns at 100 MeV and (25 ± 4 millibarns at 180 MeV. The result has some bearing upon the significance of 30P as a contributor to the delayed radiation dose after irradiation of tissues with high-energy protons. The conclusion is drawn that 30P should not be regarded important from this aspect as compared with the dominating radionuclides 15O, 11C and 13N. Author (TAB)

N66-38171# System Development Corp., Santa Monica, Calif.
COMPUTATIONAL STUDIES OF PRESENTATION STRATEGIES FOR A MULTILEVEL MODEL OF LEARNING
W. Karush and R. E. Dear 8 Jul. 1966 32 p refs
(TM-3035/000/00; AD-636941) CFSTI: HC $2.00/MF $0.50

We consider a class of 'look-ahead' rules for generating stimulus presentation strategies in learning experiments, i.e., rules on (local) optimization over the next one, two, or more trials—given the subject's state of conditioning at the current trial. In previous studies using a two-level (single-element) model from the stimulus-sampling theory of learning, we proved that R^1 indeed generated only globally optimal strategies. In the present work we hypothesize a more general, multilevel learning model and put forth two conjectures concerning the rule R^h. We report on computational studies performed to test these conjectures. The computations did not refute the conjectures (although they led to some modification). The conjectures have not yielded to analytical treatment. The primary conjecture asserts that for an m-level model of learning the R^{m-1} rule will generate a globally optimal strategy. Roughly, the second conjecture is the intuitive one that R^k is at least as good as R for ${}^hK > H$. Author (TAB)

N66-38184# Naval Medical Research Inst., Bethesda, Md.
COMPARISON OF PHYSIOLOGICAL CHANGES DURING LONG TERM IMMERSION TO NECK LEVEL IN WATER AT 95°, 85°, AND 75°F
Elizabeth Reeves, Joseph W. Weaver, James J. Benjamin, and Charles H. Mann Aug. 1966 29 p refs
(Rept.-9; AD-636989) CFSTI: HC $2.00/MF $0.50

The experiment was designed to evaluate the physiological changes which result from immersion of subjects in water to neck level for 24 hours at water temperatures of 95°, 85°, and 75°F. It had previously been determined that immersion of subjects in water below 95°F resulted in a heat loss from the body which was compensated by an increase in metabolic rate. Other changes in blood morphology and blood electrolytes had been shown to occur concomitantly with increased urinary excretion of water and electrolytes. Since the previous studies had been carried out over a relatively short period of time, the present experiments were designed to evaluate such changes over a 24-hour period, not only at 95°F water temperature but at lower water temperatures as well. It was found that the three subjects increased their metabolic rate when immersed in 85°F water and were able to maintain a normal deep body temperature over a 24-hour period. When immersed in the 75°F water, the increased oxygen consumption due to shivering was insufficient to maintain deep body temperature. In addition, the physiological discomfort of immersion at 75°F and the spiritual failure of those subjects caused the experiments to be terminated within 12 hours. The changes in the morphology and electrolyte content of the blood together with the hemoconcentration were associated with increased urinary water and electrolyte excretion and were progressive with time. Author (TAB)

N66-38188# Kyoto Univ. (Japan). Dept. of Medical Chemistry.
STUDIES ON THE METABOLISM OF NICOTINAMIDE DENINE DINUCLEOTIDE Final Report No. 6, 1 May 1965–30 Apr. 1966
Osamu Hayaishi San Francisco, Calif., Army Res. and Develop. Group (Far East), May 1966 35 p refs
(Contract DA-92-557-FEC-37959)
(J-178-6; AD-636448) CFSTI: HC $2.00/MF $0.50

In order to investigate the biosynthesis of NAD *in vivo* and to evaluate comparatively the quantitative significance of three precusors, nicotinic acid, nicotinamide and quinolinic acid, the radioactive substrates were injected directly into the portal vein of mice and the radioactive compounds in the liver were analyzed. When administered in small doses (78 μ moles per mouse), nicotinic acid was a much better precursor of NAD than nicotinamide. The incorporation of nicotinic acid-^{14}C into NAD proceeded almost linearly up to 10 minutes, thereafter NAD-^{14}C gradually decreasing to about one-half by 10 hours. Nicotinic acid ribonucleotide-^{14}C and deamido-NAD-^{14}C, the presumed intermediates in this conversion, were also detected during several minutes after the injection. In contract, nicotinamide-^{14}C injected in this way was not utilized significantly for the *de novo* synthesis of NAD during the first hour after the injection. Quinolinic acid-^{14}-C hardly penetrated into the liver cells. On the contrary, when administered in large doses (75 μ moles per mouse), nicotinamide was a much better precursor of liver NAD than nicotinic acid. With a large dose of nicotinamide-^{14}C as substrate, the total radioactivity in the liver decreased rapidly during the first hour and then increased up to almost 8 hours after the injection. During the initial phase, the incorporation of 14C into NAD was almost insignificant but NAD–^{14}C in the liver started to increase about one hour after the injection with the concomitant increase of the total radioactivity in the liver. Analyses of the distribution of 14C in various organs and tissues indicated that a large portion of nicotinamide-^{14}C was first excreted from liver, accumulated in the gastrointestinal tract, deamidated to nicotinic acid, reabsorbed into the liver and served as precursor to NAD over a prolonged period of time. TAB

N66-38192# Republic Aviation Corp., Farmingdale, N. Y.
DETERMINATION OF THE INDIGENOUS MICROFLORA OF MEN IN CONTROLLED ENVIRONMENTS Final Report, Jul. 1964–Nov. 1965
Phyllis E. Riely, Donna Geib, and Diane Shorenstein Wright-Patterson AFB, Ohio, AMRL, Apr. 1966 387 p refs
(NASA Order R-85; Contract AF 33(615)-1814)
(NASA-CR-78599; AMRL-TR-66-33; AD-636946) CFSTI: HC $7.00/MF $2.00 CSCL 06M

The objective of the study was to collect, under controlled conditions simulating space travel, microbiological data from 13 body areas of 20 subjects and their specialized environment. These data were evaluated to establish biomedical criteria for personal hygiene and sanitation for aerospace missions, and to suggest possible indices of the deterioration of environmental conditions. Data derived in the study provided information on microbial dynamics, the effects of confinement stress on the microbiological populations of individuals, and information on bacterial levels in the closed environment. The study strengthened the evidence that, in general, man can go without bathing for 6 weeks

without significant deterioration of the dermis. It pointed out the importance of sampling the groin and glans penis as "indicator" areas which quickly signal deterioration in hygienic standards. The specific buildup of both corynebacteria and micrococcaceae species in almost all sampled body sites was significant. Another objective of the program was to study the effects of the various space-type diets on the fecal flora of the subjects. The data revealed that although the obligately anaerobic character of the feces remained unchanged, the types of anaerobes recovered differed markedly from those found to be predominant in the 'normal' population. The shift in the types of anaerobic bacteria is discussed from the viewpoints of vitamin production, lactic acid production, and deaminating and decarboxylating activities. Author (TAB)

N66-38200# Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
DIAL-READING PERFORMANCE AS A FUNCTION OF FREQUENCY OF VIBRATION AND HEAD RESTRAINT SYSTEM Final Report, Mar. 1964–Jan. 1965
Harvey A. Taub Wright-Patterson AFB, Ohio, AMRL, Apr. 1966 28 p refs
(Contract AF 33(657)-11729)
(CAL-VH-1838-E-2; AMRL-TR-66-57; AD-636317) CFSTI: HC $2.00/MF $0.50

Dial-reading performance under vibration was investigated at 6, 11, and 15 cps+1 G_x (acceleration vector of gravity) ±1·1 G_x (vibration) with three X-axis head restraint configurations (a rigid restraint system, a piston-spring damper system and a spring (only) isolator system) and two Z-axis head restraint configurations (head locked in Z-axis and head allowed to move freely in the Z-axis). Ten subjects were tested. The results indicated that less decrements in performance occurred at 6 cps than at 11 and 15 cps. Further, the use of the X-axis piston-spring damper isolation system resulted in significantly less errors as compared to the X-axis rigid restraint system. At 15 cps, where all three X-axis head configurations could be compared, there was no difference in performance with the piston-spring and spring (only) systems, while both resulted in less errors than the rigid system. Finally, the Z-axis restraint system had an effect upon performance only at 15 cps. The data suggested that allowing the head to move freely in the Z-axis at 15 cps resulted in less errors than when the head was locked in the Z-axis. Author (TAB)

N66-38201# Carnegie Inst. of Tech., Pittsburgh, Pa.
DISEMINER: A DISTRIBUTION-SEMANTICS INFERENCE MAKER
Sheldon Klein, Stephen L. Lieman, and Gary E. Lindstrom 13 Jun. 1966 37 p refs
(Contract ARPA SD-146; NIH G-MH-07722)
(AD-636380) CFSTI: HC $2.00/MF $0.50

The purpose of the DISEMINER system is to explore the relation between lexical distribution criteria and semantics. It is hoped that the system, in its learning mode, will be useful in collecting data for deriving semotactic rules in a stratificational grammar. The system, written in ALGOI 20 and operational on the G-21 computer, is capable of learning distribution classes of lexical items through the processing of text, and using distributional criteria to answer questions that are broader than the context of the text processed. The methodology follows a line of research that was considered, but never followed, in early work on the SYNTHEX project. Distributional information is stored in terms of a dependency structure that differs from the SYNTHEX version in that dependency relations among stem types, rather than stem tokens, are stored in matrix format. That is, each stem is listed only once, and its dependency relations in all text processed by the system are associated with a single entry. (In the SYNTHEX system, separate dependencies are tabulated for each occurrence of a stem.) The stored relations include all possible transitive paths as well as direct ones. Because dependency analysis is weakly equivalent to phrase structure analysis, it is possible to view this data structure as a tabulation of the distributional potential of stems with respect to phrase structure criteria rather than criteria of linear contiguity. Author (TAB)

N66-38220# Aerospace Medical Div. Personnel Research Lab. (6570th), Lackland AFB, Tex.
ABSTRACTS OF PERSONNEL RESEARCH REPORTS. VI: 1954–1965
Jo Ann Elson, comp. Dec. 1965 107 p refs
(PRL-TR-65-23; AD-636607) CFSTI: HC $4.00/MF $0.75

The volume includes abstracts of the 374 technical reports issued by the Personnel Research Laboratory January 1954 through December 1965. They cover studies in selection, classification, and utilization of Air Force personnel; systematizing information flow in support of personnel planning; methods of describing, evaluating, and structuring Air Force jobs; and development of procedures for improving the quality of Air Force personnel. Author (TAB)

N66-38228# Louvain Univ. (Belgium). Cardiopulmonary Lab.
BEAT TO BEAT REGULATION OF THE PULMONARY CIRCULATION IN CONSCIOUS DOGS. THE EFFECTS OF NORMAL RESPIRATION
A. A. Charlier 30 Nov. 1964 41 p refs
(Contract AF 61(052)-738)
(SR-1; AD-636692) CFSTI: HC $2.00/MF $0.50

In mongrel dogs, electromagnetic transducers were surgically implanted around the main pulmonary artery and at the root of the aorta. A week after the procedure, the effects of normal respiration on different parameters of the pulmonary circulation were investigated in healthy conscious animals. Mean pulmonary-left atrial pressure gradient (PA-LA), right and left ventricular stroke volume (SV), change in pulmonary-left heart central blood volume (P-LH.CBV) were monitored on a beat to beat basis at different times of the respiratory cycle. PA-LA mean pressure gradients only showed slight variations of .3 to 1.0 cm H_2O with minimal values before and around peak inspiration. Right SV always increased during inspiration with maxima around peak inspiration while left SV showed similar variations with maxima occurring between the end of expiration and the inspiratory phase depending on the rate of breathing. P-LH.CBV changes up to 8 ml were observed during the respiratory cycle; their magnitude and exact timing varied with rates and depth of breathing. Beat to beat relationships between mean PA-LA gradient over right SV per second of ejection were used as an index of pulmonary vascular resistance (PVR). Author (TAB)

N66-38241# University of Southern Calif., Los Angeles. Dept. of Psychology.
COMPUTER PERSONNEL SELECTION AND CRITERION DEVELOPMENT. III: THE BASIC PROGRAMMING KNOWLEDGE TEST
Joseph W. Rigney Jun. 1966 51 p refs
(Contract Nonr-228(22))
(TR-49; AD-636988) CFSTI: HC $2.00/MF $0.50

The Basic Programming Knowledge Test (BPKT), is intended to stand by itself as a criterion of programming proficiency. To achieve a close correspondence of test content to programming job requirements, subject-matter experts participated in the construction and review of the test questions. Test questions were selected that met the criteria of discrimination and appropriate difficulty, as indicated by the statistical analysis of results of a large preliminary testing. The final form of the test consists of 100 multiple-choice questions that are designed to be free of

references to specific computers and languages now in use. Normative scores were developed for Navy computer groups. The relationships of the BPKT test scores to a number of vocational and education variables are described. Author (TAB)

N66-38243# Dunlap and Associates, Inc., Santa Monica, Calif. Western Div.

MEASURES OF PILOT PERFORMANCE: COMPARATIVE ANALYSIS OF DAY AND NIGHT CARRIER RECOVERIES Final Report

Clyde A. Brictson Jun. 1966 149 p refs

(Contract Nonr-4984(00))

(AD-636433) CFSTI: HC $4.00/MF $1.00

The research purpose was to explore the psychophysical differences implied by a day/night carrier landing accident ratio of 1:4. The approach required a valid and reliable in-flight measure of pilot landing performance to (a) determine quantitative differences between day and night landings, and (b) differentiate the influence of day and night visual information performance. An attempt to quantify and define day/night pilot landing performance was the subject of a field experiment in which landing performance was recorded for 21 Navy F4 pilots during day and night carrier landing operations. Altitude and lateral error were the principal measures of pilot performance. Results: generally, pilots tended to approach slower and higher, and land harder and shorter by day than by night. Significant differences were found between day and night pilot altitude performance at 1/4 mile ($<.01$) and 1/8 mile ($<.05$) from touchdown with night altitude error variability at least twice that recorded during the day. By dat, pilot approaches were consistently above glide slope while approximately 1/4 of all night landings were below glide slope. Pilot perceptual ability and experience factors resulted in significant multiple correlations for predicting day lateral error performance. It was concluded that an empirical criterion of pilot landing performance was necessary to gain insight into the radically different visual and perceptual environments encountered in day and night carrier landings. Author (TAB)

N66-38262# Lockheed-Georgia Co., Marietta.

PERCEPTUAL-PSYCHOMOTOR TESTS IN AIRCREW SELECTION: HISTORICAL REVIEW AND ADVANCED CONCEPTS

George E. Passey and William A. Mc Laurin Lackland AFB, Tex., Personnel Res. Lab., Jun. 1966 245 p refs

(Contract AF 41(609)-2796)

ER-8077; PRL-TR-66-4; AD-636606) CFSTI: HC $6.00/MF $1.25

The report reviews the literature reflecting the employment of perceptual-psychomotor tests for selection of aircrew members since World War II and provides behavioral concepts for consideration as possible future test development areas. The review considers the use of flight experience as well as perceptual-psychomotor screening devices and comments on the results of the programs in which such experience is intentionally used. The fundamental importance of criterion definition to development and validation of selection devices is discussed. Recent research is reviewed leading to the derivation of behavioral concepts recommended for consideration as principles on which new perceptual-psychomotor tests may be based. The merits of simple tests as opposed to complex tests in which numerous facets of performance are concurrently assessed are considered and the latter approach is recommended. Author (TAB)

N66-38280# Illinois Univ., Urbana. Dept. of Psychology.

EFFECTS OF TASK CHARACTERISTICS ON GROUP PRODUCTS Technical Report No. 5

J. Richard Hackman Jun. 1966 162 p refs

(Contract AF 49(638)-1291)

(AFOSR-66-0893; AD-636997) CFSTI: HC $5.00/MF $1.00

The most substantial determiner of product variance was task type. The task difficulty factor controlled a moderate proportion of the product variance, as did the interaction between task type and difficulty. Order of presentation was essentially unrelated to the product dimensions, either as a main effect or in interaction with other factors. All of the product dimensions were involved in significant relationships with one or more of the experimental factors. The percentage of variance associated with these relationships ranged from a high of 59 per cent (for action orientation) to a low of 15 per cent (for adequacy). Finally, produce "creativity' was successfully predicted from the product dimensions in multiple regression analyses, and different patterns of beta weights were obtained for the product dimensions when predictions were made separately for the three types. Author (TAB)

N66-38285# George Washington Univ., Washington, D.C. Human Resources Research Office.

EXPERIMENTAL STUDIES OF SENSORY DEPRIVATION AND SOCIAL ISOLATION

Thomas I. Myers, Donald B. Murphy, Seward Smith, and S. James Goffard Jun. 1966 79 p refs

(Contract DA-44-188-ARO-2)

(HumRRO-TR-66-8; AD-636478) CFSTI: HC $3.00/MF $0.75

To evaluate experimentally some of the psychological effects of sensory deprivation and social isolation, 176 randomly selected volunteers were placed in dark, soundproofed cubicles for four days, while an equal number of other randomly selected volunteers followed a normal routine. Psychological tests and measures were given both cubicle and control subjects before, during, and after isolation. Cubicle subjects reported the isolation experience to be unpleasant, boring, and stressful. One-third of them requested early release from the cubicles. In comparison with the control subjects, cubicle subjects were better on simple intellectual tasks and on auditory vigilance. They were worse on more complex intellectual tasks, and under some conditions, appeared to be more susceptible to influence. They more often sought meaningful stimulation but also showed some tendency to avoid stimulation. Sensory deprivation and social isolation do have psychological effects, but they are neither simple nor clear-cut. Author (TAB)

N66-38305# Pacific Missile Range, Point Mugu, Calif.

EXPERIMENT ON EFFECT OF ALCOHOL ON UPTAKE OF CARBON MONOXIDE BY THE BLOOD

S. Goren 5 Aug. 1966 23 p refs

(PMR-TM-66-5; AD-637115) CFSTI: HC $1.00/MF $0.50

Work was performed at the Pacific Missile Range to test the hypothesis that alcohol could affect the uptake of carbon monoxide in humans, possibly producing an effect more toxic than either alone. A preliminary experiment was performed to determine the effect of carbon monoxide on four small groups of guinea pigs fed to standard diet plus alcohol and other drugs. The results indicated that small amounts of alcohol over a comparatively long period slow the lethal saturation time of hemoglobin with the carbon monoxide. Alcohol and carbon monoxide appear antagonistic under such conditions. Ammonium chloride appears to cause an increase in the uptake of carbon monoxide. This is evident either as an acceleration of carbon monoxide combining time with hemoglobin or a greater total carbon monoxide hemoglobin level attained. It appears that both factors are operative. Sodium bicarbonate does not appear to contribute any beneficial effect on the uptake of carbon monoxide because alcohol has apparently not increased the carbon monoxide uptake rate under conditions of the experiment (i.e., low-level chronic exposure). Author (TAB)

N66-38313# Texas Univ., Austin.
SOME EFFECTS OF MIXED IONIZING RADIATIONS ON RHESUS PRIMATES EXPOSED UNDER LABORATORY CONDITIONS Technical Report, Jan. 1954–May 1964
G. S. Melville, Jr., W. Lynn Brown, A. A. Mc Dowell, J. E. Pickering, G. W. Harrison, Jr. et al Brooks AFB, Tex., School of Aerospace Med., May 1966 34 p refs Prepared in cooperation with the School of Aerospace Med.
(Contract AF 41(609)-2005)
(SAM-TR-66-48; AD-637688) CFSTI: HC $2.00/MF $0.50

The radiobiologist has been concerned with both the early and late effects of ionizing radiations administered in small increments over a relatively long period of time. In 1954, 48 *Macaca mulatta* primates were exposed to an irradiation schedule involving fast neutrons and gamma rays which resulted in the accumulation of doses from 77 to 614 rep. Since the exposure schedules afforded rest and recovery periods, it was proposed and found that the effects were less severe than the effects from comparable doses given acutely. The principal early effect noted was a transient decrease in peripheral cell counts for leukocytes and erythrocytes noted in the higher dose group. The principal late effects involved a reduction in visual acuity in the 307- and 614-rep groups; a series of definitive, continuing behavioral changes; and evidence of dose-dependent testicular damage as noted by histopathologic methods. Evaluation of the data suggests that radiation was probably not a factor in life-shortening. Author (TAB)

N66-38315# School of Aerospace Medicine, Brooks AFB, Tex.
A FORMULA FOR HUMAN PAROTID FLUID COLLECTED WITHOUT EXOGENOUS STIMULATION, JANUARY 1961–JANUARY 1966
Ira L. Shannon May 1966 9 p refs
(SAM-TR-66-52; AD-635610) CFSTI: HC $1.00/MF $0.50

Parotid fluid was collected from 4,589 systemically-healthy males between 17 and 22 years of age. Collection devices were placed with an absolute minimum of manipulation, and sampling continued for 90 to 120 minutes. Every effort was made to obtain, as nearly as possible, the unstimulated secretion of the parotid gland. For all 4,589 subjects from the 8 experiments the mean rate of flow was 0.040 ml./minute with an average standard deviation of 0.031 ml./minute. Values are given for 14 variables, including sodium, potassium, chloride, calcium, and phosphorus. Author (TAB)

N66-38341# Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Institut fuer Steuer- und Regeltechnik.
EXPERIMENTAL STUDY OF THE HUMAN PROCESS OF LEARNING DURING OPTICAL SIGHT CONTROL [EXPERIMENTELLE UNTERSUCHUNG DES MENSCHLICHEN LERNVORGANGES BEIM STEUERN NACH OPTISCHER SICHT]
Georg Toepfer Jul. 1966 40 p refs In GERMAN; ENGLISH Summary
(DLR-FB-66-48; DVL-519) CFSTI: HC $2.00/MF $0.50

The human process of learning was to be studied by means of so-called socalled plate simulator under acceleration and velocity controls. The average number of hits made in each case was used to plot the regression lines. Their gradients as a measure of rate of learning were nearly identical in both cases, but the absolute values as a measure of efficiency of the process were about 100% higher for the velocity control as compared to acceleration control. The learning process could not be followed up to the saturation stage because it was impossible to employ an adequate number of persons for testing in the short time available. The study was therfore discontinued. Author

N66-38359# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.
HEALTH PHYSICS CONTROL OF BERYLLIUM AT A.E.R.E., HARWELL
J. S. Pollock and I. S. Jones Jul. 1966 40 p refs Amended (AERE-R-5106) HMSO: 9s

Work on beryllium and its compounds has been carried out at Atomic Energy Research Establishment (A.E.R.E.) Harwell for about fifteen years. Up to about two years ago smear and air samples taken in the beryllium areas were evaluated by spectrographic means. With the development of the γ-n counter it has been possible to undertake a more comprehensive routine sampling programme of the breathing air and surface contamination measurements in beryllium process areas. This report presents the results of this monitoring programme. On the basis of the work carried out recommendations are made concerning the demarcation of beryllium areas at A.E.R.E. and on the derived working limit for surface contamination at this establishment. Author

N66-38368# Weizmann Inst. of Science, Rehovoth (Israel). Biochemistry Section.
MECHANISM OF PHOTOPHOSPHORYLATION Final Report
Mordhay Avron 30 Apr. 1966 10 p refs
(Grant AF-EOAR-64-19)
(AFOSR-66-1462; AD-636333) CFSTI: HC $1.00/MF $0.50

Several aspects of the mechanism of photophosphorylation were investigated. The approaches included: structural degradation; determination of the path of the phosphate-oxygen; the relation of light induced ATPase-reactions to photophosphorylation; the localization of the site of ATP formation; studied with low-potential dyes; new inhibitors and uncouplers and their site of action; the isolation of a new enzyme, ADP-ribose phosphorylase from Euglena, and review of work in the field. Author (TAB)

N66-38396# Dunlap and Associates, Inc., Santa Monica, Calif. Western Div.
THE ROLE OF PREDICTION IN TRAINING WITH A SIMULATED ORBITAL DOCKING TASK
Charles R. Kelley, Meredith B. Mitchell, Michael J. Wargo and Daniel J. Prosin Port Washington, N. Y., Naval Training Device Center, Jun. 1966 114 p refs
(Contract N61339-1767)
(NAVTRADEVCEN-1767; AD-636848) CFSTI: HC $4.00/MF $0.75

A review of the literature relating to the role of prediction in manual control resulted in substantial evidence indication that learning to control vehicles in complex maneuvers such as orbital docking is primarily a matter of learning to predict the future states of the vehicle. The purpose of this project was to: (a) investigate the relation between the ability to predict and manual control skill, and (b) determine the effect of prediction training on learining vehicular control. Two simulated docking experiments were performed. The results supported the sypothesis that ability to control is highly correlated with ability to predict. It was also demonstrated that while prediction training alone is not more effective than standard training, a combination of the two training methods appears to be much more effective than training in either control or prediction alone. It is therefore recommended that manual control training programs incorporate training in prediction. It is also recommended that associated training devices be revised or developed so as to incorporate means of training prediction skills and of measuring prediction capability. Author (TAB)

N66-38413*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
FIXED-BASE VISUAL-SIMULATION STUDY OF MANUALLY CONTROLLED TRANSLATION AND HOVER MANEUVERS OVER THE LUNAR SURFACE
G. Kimball Miller, Jr. Washington, NASA, Oct. 1966 26 p refs
(NASA-TN-D-3653) CFSTI: HC $1.00/MF $0.50 CSCL 05H

A fixed-base visual-simulation study has been conducted to determine the ability of the human pilot to control a lunar landing vehicle manually during translation and to hover above various landing sites in a given landing area. The general landing area used in this investigation was the interior of the crater Alphonsus as created by the lunar orbit and landing approach. The investigation employed a closed-circuit television system for image generation and permitted all six rigid-body degrees of freedom of the vehicle. The pilot controlled the vehicle through a fixed main-engine thruster in conjunction with a rate-command landing-approach transition phase of a typical lunar landing trajectory. The pilot was required to switch to manual control in order to place the landing vehicle in near-hover conditions over any one of a number of sites that he felt would be acceptable for landing. The results of the investigation showed that the pilots, using only a three-axis gyro-horizon nulled to the local vertical and an out-the-window view of the lunar surface, could consistently establish near-hover conditions over a fairly large lunar area. The landing sites attained by the pilots extended from approximately 2300 feet (701-0) up range of (before) to approximately 7700 feet (2347.0 m) down range of (beyond) the nominal landing site. Author

N66-38460# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

PREPARATION AND USE OF STANNOUS FLUORIDE SOLUTIONS AND INGESTIBLE DENTIFRICE

Ira L. Shannon May 1966 13 p refs *Its* Aeromed. Rev.-2-66 (AD-636984) CFSTI: HC $1.00/MF $0.50

The materials listed in the report were developed in the experimental dentistry branch, USAF School of Aerospace Medicine, in response to specific USAF requirements in preventive dentistry. This review outlines procedures for the preparation and use of these compounds and, when applicable, provides directions for obtaining the fully prepared material. The USAF dental service endorsement of the SAM series of topical SnF_2 agents is based upon in vitro studies demonstrating the ability of these preparations to protect dental enamel from acid decalcification. It has been shown that: (a) stannous fluoride solutions of low concentration provide excellent protection, and (b) stannous fluoride should be frequently applied to provide maximal benefit. TAB

N66-38466# Indiana Univ., Bloomington.

OPERANT CONDITIONING OF SPONTANEOUS GSRs: TWO UNSUCCESSFUL ATTEMPTS

Robert M. Stern (Penn. State Univ.), John Boles, and Joan Dionis Jul. 1966 13 p refs Prepared in cooperation with Penn. State Univ.

(Contract Nonr-908-15)

(TR-13; AD-637015) CFSTI: HC $1.00/MF $0.50

Two attempts to operantly condition spontaneous GSR's are described. In the first, a dim light was used as reinforcement and in the second, nickels. In neither case was there any indication of conditioning. The procedure and results of these studies are discussed in reference to recent positive findings of other investigators working in this area. Author (TAB)

N66-38468# System Development Corp., Santa Monica, Calif.

A NEW TASK ENVIRONMENT FOR GAKU TEAMED WITH A MAN

Aiko Hormann 27 May 1966 26 p refs

(Contract Nonr-4745(00))

(TM-2311/003/000; AD-636480) CFSTI: HC $2.00/MF $0.50

An experimental environment designed for man/machine problem-solving is described. Criteria for an adequate experimental task environment are that it contain problematic features like those of the real world, that it be formalizable and controllable, and that it contain elements that are both familiar and unfamiliar to most adult humans. The experimental environment devised to meet these criteria is a four-dimensional four-in-a-row game called Shimoku. The game contains scoring elements similar to poker, and moves are made by sliding or exchanging counters on the playing spaces of the 16 planes of the hypercube. It is anticipated that this environment will provide sufficient complexity and variability to serve as a vehicle for testing the gaku program system and studying the behavior of man and machine when they function as an interacting problem-solving team. Author (TAB)

N66-38469# Delaware Univ., Newark. Center for Research on Social Behavior.

VISUAL INTERACTION IN RELATION TO MACHIAVELLIANISM AND AN UNETHICAL ACT

Ralph V. Exline, John Thibaut, Carole Brannan, and Peter Gumpert (N. C. Univ.) 1 Aug. 1966 58 p refs Prepared in cooperation with N. C. Univ.

(Contract Nonr-2285(02))

(TR-16; AD-636534) CFSTI: HC $3.00/MF $0.50

The study is based on the proposition that communication between and among persons is carried on at several levels at once. The activity of the other's eyes is an extremely important source of the expressive information one gathers and sifts in the process of forming impressions of others. (TAB)

N66-38485# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

REACTIVITY OF ADRENERGIC AND CHOLINERGIC RECEPTORS IN ACUTE RADIATION

Andrzej Danysz 4 Apr. 1966 102 p refs Transl. into ENGLISH of the book "Odczynowosc Zakonczen Adrenergicznych i Cholinergicznych w Ostrej Chorobie Popromiennej" Warsaw, Roczniki Akad. Med. w Bialymstoku, 1961 p 1-84

(FTD-TT-65-941; TT-66-61904; AD-636585) CFSTI: HC $4.00/MF $0.75

Translation of Polish Research: Reactivity of Adrenergic and Cholinergic Receptors in Acute Radiation. TAB

N66-38499*# TRW Equipment Labs., Cleveland, Ohio. New Products Dept.

CARBON DIOXIDE CONCENTRATION SYSTEM Final Report

A. D. Babinsky, D. L. de Respiris, and S. J. Derezinski 30 Jul. 1966 177 p

(Contract NAS3-7638)

(NASA-CR-72086; TRW-ER-6661-9) CFSTI: HC $3.25/MF $1.25 CSCL 06K

An experimental program was conducted to determine the feasibility of an electrochemical means of concentrating CO_2 from cabin air while obtaining engineering design data for future system prototype design. Studies were made using both small laboratory type cells and large (12" × 12" electrode area) test cells. The first two stages of the three stage system used an electrolyte of potassium carbonate while the third stage utilized sulfuric acid. The large carbonate cells had end plates fabricated of gold and nickel plated magnesium, while PVDC plastic was used for the acid cell end plates. Short term parametric tests were conducted for current densities ranging from 15 to 45 ASF, and cell temperatures ranging from 90° to 140°F for Stage I, 122° to 176°F for Stage II, and 172° to 195°F for Stage III. Author

N66-38536# Life Sciences, Inc., Fort Worth, Tex.

A REVIEW OF THE ANALYSIS OF VISUAL DISCRIMINATIONS IN HELICOPTER CONTROL

J. R. Thielges and W. G. Matheny Jun. 1966 14 p Presented at the Southwestern Psychological Assoc. Meeting, Arlington, Tex., 21-23 Apr. 1966 Prepared for George Washington Univ. *Its* Profess. Paper 4-66

(Contract DA-44-188-ARO-2)

(AD-636579) CFSTI: HC $1.00/MF $0.50

The paper describes research performed under HumRRO-Task ROTOR. Design of Rotary Wing Training Devices. An analysis was conducted of the necessary and sufficient cues for maintaining vehicle stability in pitch, roll, yaw, altitude, range, and latitude, and a model was developed which expresses the relationship between the cue sources and the information they provide about the vehicle stability in flight. The paper discusses the portion of the analysis which deals with the cue structure of the pilot's visual environment and the development of the model. Author (TAB)

N66-38575# Michigan State Univ., East Lansing. Div. of Engineering Research.
AN ITERATED NET MODEL OF THE VERTEBRATE COMMAND AND CONTROL SYSTEM Final Scientific Report, 1 Mar. 1965–28 Feb. 1966
W. L. Kilmer et al 1 Mar. 1966 136 p refs
(Contract AF 19(628)-5076)
(AFCRL-66-356; AD-636322) CFSTI: HC $4.00/MF $1.00

An eigenstate approach to the problem of stable biosynthetic mode points in cells is considered. This problem is cybernetically dual to the reticular formation one of passing from stable mode point to stable mode point under input provocation. The report also discusses a theory of the reticular formation. Throughout the life of the vertebrates, the core of the central nervous system, sometimes called the reticular formation, has retained the power to commit the whole animal to one mode of behavior rather than another. Its anatomy, or wiring diagram, is fairly well known, but do date no theory of its circuit action has been proposed that could possibly account for its known performance. Its basic structure is that of a string of similar modules, wide but shallow in computation everywhere, and connected not merely from module to adjacent module, but by long jumpers between distant modules. Analysis of its circuit actions heretofore proposed in terms of finite automata or coupled nonlinear oscillators has failed. Nonlinear, probabilistic hybrid computers are proposed as proper modules, and a behavioral simulation of an anastomatically-coupled linear array of 12 such computers is described. The model contains about 2200 wires, yet still behaves as an integral unit, rolling over from stable mode to stable mode according to abductive logical principles, and as directed by its succession of input 60-tuples. Author (TAB)

N66-38628# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
FORMATION OF LONG-LIVED ORGANIC RADICALS IN IRRADIATED AQUEOUS SOLUTION
D. R. Kalkwarf and R. N. Dievel 26 May 1966 9 p refs
(Contract AT(45-1)-1830)
(BNWL-SA-712) CFSTI: HC $1.00/MF $0.50

A study was conducted to determine the chemical structure and reactivities of organic, free-radical intermediates and their role in radiobiological damage. It was found that radioinduced organic radicals are stable for minutes to days in aqueous solution. Similar radicals are thought to exist also in irradiated biological systems; further investigations are suggested. NSA

N66-38690# Joint Publications Research Service, Washington, D. C.
THE "COLOR" OF THE VOICE
V. Morozov 4 Oct. 1966 24 p Transl. into ENGLISH from Nauka i Yhizn. (Moscow), no. 2, Feb. 1966 p 24-31
(JPRS-37985; TT-66-34412) CFSTI: $1.00

A narrative account is given of the timbre of the voice, its effects on listeners, and means of determining voice quality. It is pointed out that while in ordinary speech the character of voice timbre is not particularly essential, in the art of singing it is the most important property. The influence of the emotional state on the sonority of voice is mentioned. The qualities of musical formant and the vibrato are discussed. A brief description of the part played by vocal cords, larynx, mouth, and pharynx in producing voice coloration is included. N.E.N.

N66-38692# Joint Publications Research Service, Washington, D. C.
THE CHARACTERISTICS AND ORIGIN OF DELAYED REACTIONS IN DOGS
I. S. Beritashvili, I. M. Ayvazashvili, and Ts. A. Ordzhonikidze 4 Oct. 1966 22 p refs Transl. into ENGLISH from Tr. Inst. Fiziol Akad. Nauk Gruz. SSSR (Tbilisi), v. 1, 1965 p 23-37
(JPRS-37984; TT-66-34411) CFSTI: $1.00

Delayed reactions in dogs with respect to visual, aural, and labyrinth stimuli reception were studied in detail. The maximum period of the delayed reaction to these stimuli, the role of the type of nervous system, the significance of training in multiple testing of a delayed reaction, and the influence of strange, unusual stimuli on the reaction delay period were established. In the same dogs, the role of various regions of the cerebral cortex in promoting delayed reactions were investigated. The experimental situation involved the dog in locating a loaded feedbox through sight, hearing, or smell. Results confirm that basically delayed reactions in higher vertebrate behavior are realized according to the laws of descriptive psychonervous activity, and not according to the laws of conditioned reflex activity. N.A.S.

N66-38703# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
TIMING BEHAVIOUR AND PERCEPTUAL INFORMATION
J. A. Michon and N. J. L. van der Valk [1966] 14 p refs
(IZF-1966-5; TDCK-45813) CFSTI: HC $1.00/MF $0.50

A preliminary theoretical exposition of a simple dynamic model for the description of human timing behavior in a variety of time evaluation tasks is reported. The model essentially entails a near perfect linear extrapolator in the sense of linear sampled data systems analysis. Though not all variance of the empirical data is accounted for by the model, it gives a close fit in a number of experimental situations. Author

N66-38705*# Michigan Univ., Ann Arbor.
OPTIMAL LEARNING IN DETECTION SITUATIONS First Semiannual Status Report, Period Ending Jun. 30, 1966
Wilson P. Tanner [1966] 24 p refs
(Grant NGR-23-005-159)
(NASA-CR-78511) CFSTI: HC $1.00/MF $0.50 CSCL 05J

Theoretical results regarding sensitization learning of human observers in acoustical tasks are presented. These results show that it is possible to obtain performance measures from human subjects which enable the experimenter to keep track of the level of learning achieved by the subject. The theory of statistical adaptation devices is reviewed, and a typical psychoacoustical detection experiment is described. The adaptive devices for detection of uncertain waveform patterns in noise, and performance measures for learning devices are discussed. Efficiency estimation procedures are outlined, and nonsupervised learning of signal waveform patterns was emphasized. N.E.N.

N66-38718*# West Virginia Univ., Morgantown.
THE EFFECT OF CHANGING GRAVITY AND WEIGHTLESSNESS ON VASOPRESSIN CONTROL SYSTEMS Progress Report, Feb. 15–Sep. 20, 1966
Wlater H. Moran, Jr. [1966] 15 p
(Grant NGR-49-001)-019)
(NASA-CR-78494) CFSTI: HC $1.00/MF $0.50 CSCL 06S

The mechanism of antidiuretic hormone (ADH) destruction in whole blood was studied in order to devise a method of preserving ADH activity in samples. Experiments were conducted

with dog blood. Considered were the effects of temperature, pH, chelating agents, and freezing on the stability of ADH. Blood samples containing high levels of ADH were examined for the dynamics of the most potent stimulator of ADH release, i.e., hemorrhage. Plasma and extracts were analyzed, and a possible method for removing the interfering ADH is briefly described. It is emphasized that the best results are obtained when blood samples for ADH assay are processed within one minute. Lowering of the sample temperature and the addition of chelating agents (e.g., 2Na-EDTA) are pointed out as alternatives to immediate processing. A procedure for shipping blood samples to the laboratory is suggested. K.W.

N66-38729*# Naval School of Aviation Medicine, Pensacola, Fla.

THE ELECTROENCEPHALOGRAM OF THE SQUIRREL MONKEY *(SAIMIRI SCIUREUS)* IN A VERY HIGH MAGNETIC FIELD

Dietrich E. Beischer and James C. Knepton, Jr. Jun. 1966 21 p refs Joint Rept. with NASA
(NASA Order R-39)
(NASA-CR-78539; NAMI-972) CFSTI: HC $1.00/MF $0.50 CSCL 06S

In preparation for an appraisal of the possible effect of strong magnetic fields on cerebral functions electroencephalograms of squirrel monkeys subjected to strong homogeneous and gradient fields (up to 91,250 oersted) were measured. Higher than normal amplitudes and frequencies were found in the recordings from exposed animals. The unusual EEG records are discussed and an attempt is made to explain the observation. The study is part of a plan to investigate interaction of magnetic fields with the nervous system in general. Author

N66-38739# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

BIOELECTRIC CONTROL IN MEDICINE

V. S. Gurfinkel 29 Apr. 1965 15 p Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (Moscow), no. 2, 1964 p 33–38 (FTD-TT-64-1019; TT-65-62216; AD-615216) CFSTI: HC $1.00/MF $0.50

A review is given of the instruments and devices used for medical investigation, diagnosis, and therapeutics that have bioelectric potentials as control signals. Electrocardiography, electroencephalography, and prosthetic and orthopedic instruments used with skeletal muscles are examples. TAB

N66-38751*# Serendipity Associates, Los Angeles, Calif.

A STUDY OF POTENTIAL ROLES OF SUPERSONIC TRANSPORT CREWS AND SOME IMPLICATIONS FOR THE FLIGHT DECK. VOLUME II: FEASIBLE AUTOMATED AND MANUAL IMPLEMENTATION CONCEPTS FOR SST ACTIVITIES AND FUNCTIONS

Harold E. Price, William D. Honsberger, and William J. Ereneta Washington, NASA, Oct. 1966 612 p refs
(Contract NAS2-2209)
(NASA-CR-562) CFSTI: HC $6.00/MF $3.00

Basic functions of flight management in SST operations are discussed. Specifically analyzed are data monitoring and evaluation, data recording, and system reconfiguration. Phase oriented system checks and preparations that are covered included equipment setup, performance verification, and overall system readiness prior to a given flight phase. Discussed as part of the manual and automated implementation concepts for SST communications are air traffic control, ground handlers and dispatcher communications, intra-crew communications, and crew-passenger communications. All aspects of powerplant operation during the various flight phases are analyzed. Studied are the functions and problems of stability and control during ground operations and while in flight. Matching of the inlet duct and exhaust nozzle system to the requirements of the engine is examined. The navigation system and navigational accuracy are discussed in terms of the basic considerations of flight safety and economical airline operation. K.W.

N66-38756*# Douglas Aircraft Co., Inc., Huntington Beach, Calif. Missile and Space Systems Div.

EXPERIMENTAL STUDY OF DYNAMIC EFFECTS OF CREW MOTION IN A MANNED ORBITAL RESEARCH LABORATORY (MORL)

W. F. Fuhrmeister and J. L. Fowler Oct. 1966 199 p refs
(Contract NAS1-5937)
(NASA-CR-66186) CFSTI: HC $3.25/MF $1.25 CSCL 05H

Disturbance profiles of routine crew motions in the shirtsleeve environment of the Manned Orbital Laboratory (MORL) are investigated. These routine crew motions include body segment motion, locomotion, console operation, and exercises. Each crew motion is performed by a test subject suspended in a counterbalanced pendulous support which simulates zero-g environment. The disturbance profiles of each motion are presented both analytically as a Fourier series and graphically. The predominate frequencies of the disturbance profiles are between 1 to 2 cps, with the amplitudes varying from 2.6 lb during the single pendulum arm motion to 350 lb during free soaring. Author

N66-38775# Joint Publications Research Service, Washington, D. C.

THE SIMULATION OF PSYCHOSENSORY DISORDERS RESULTING FROM TEMPORARY WEIGHTLESSNESS

F. D. Gorbov, O. N. Kuznetsov, and V. I. Lebedev 13 Oct. 1966 18 p refs Transl. into ENGLISH from Zh. Nevropatol. i Psikhiatr. (Moscow), v. 66, issue 1, Oct. 1966 p 81–88
(JPRS-38140; TT-66-34567) CFSTI: $1.00

Models of a number of clinical syndromes have been constructed to simulate the influence of temporary weightlessness on the human; and depersonalization and derealization are designated as the most common syndromes which occur. A general review of psychosensory disorders noted during space flight and aviation experience is treated in terms of these syndromes, and various examples taken from the literature are given. It is concluded that there is significant similarity between clinical data on psychosensory disorders and the perception disorders observed during weightlessness and extreme flight conditions. M.W.R.

N66-38793*# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aviation Medical Center.

THE ELECTROENCEPHALOGRAM OF THE SQUIRREL MONKEY (SAIMIRI SCIUREUS) IN A VERY HIGH MAGNETIC FIELD

Dietrich E. Beischer and James C. Kenpton, Jr. 9 Jun. 1966 21 p refs
NASA Order R-39)
(NASA-CR-78660; NAMI-972) CFSTI: HC $1.00/MF $0.50 CSCL 06C

In preparation for an appraisal of the possible effect of strong magnetic fields on cerebral functions electroencephalograms of squirrel monkeys subjected to strong homogeneous and gradient fields (up to 91,250 oersted) were measured. Higher than normal amplitudes and frequencies were found in the recordings from exposed animals. The unusual EEG records are discussed and an attempt is made to explain the observation. The study is part of a plan to investigate interaction of magnetic fields with the nervous system in general. Author

N66-38795*# Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME I, PART 2: INSTRUMENTATION
F. Larmie [1966] 45 p refs
(Contract NAS1-4449)
(NASA-CR-66116; NSL-65-153, Vol. I, Pt. 2) CFSTI: HC $2.00/MF $0.50 CSCL 06B

The instrumentation for monitoring physiological variables of body temperatures, heart rate, and respiration rate is described. The system was constructed around an eight-channel biomedical strip chart recorder, a four-channel magnetic tape recorder, a dc power supply, and a thermistor temperature indicator. Since many variables were to be monitored and because of the need for a suit pressurization line, a hard wire umbilical was used. Other variables monitored were the ECS temperatures, expired air temperature, globe thermometer temperature, and suit pressure. The instrumentation system is described as reliable, and the feasibility of using a hard wire umbilical over extended distances to obtain physiological data is demonstrated. S.P.

N66-38796*# Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME II, PART I: BIOMECHANICS RESEARCH PROGRAM
Walter Kuehnegger [1966] 379 p refs
(Contract NAS1-4449)
(NASA-CR-66117; NSL-65-153, Vol. II, Pt. 1) CFSTI: HC $4.25/MF $2.00 CSCL 06B

This portion of the study was carried out to investigate certain biomechanics parameters of a set of predetermined modes and series of experiments under simulated lunar gravity. To assimilate the required data, a camera for the recording of biomechanics data was developed. In conjunction with the data camera, a grid system was developed and installed on the Lunar Gravity Simulator, and a computer program was established for each of the 2450 grid squares. After having obtained acceptable data recordings from the biomechanics data camera, a computer program was written for the complete biomechanics motion analysis. The biomechanics results of this study showed that man is capable of self locomotion and physical work under simulated lunar gravity conditions. When compared to equivalent earth gravity experiments, it was found that his capability is enhanced by the reduction in gravity. H.W.S.

N66-38797*# Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME II, PART 2: BIOMECHANICS RESEARCH PROGRAM APPENDICES
Walter Kuehneger [1966] 363 p refs
(Contract NAS1-4449)
(NASA-CR-66118; NSL-65-153, Vol. II, Pt. 2) CFSTI: HC $4.25/MF $2.00 CSCL 06B

Supplementary biomechanics research experiments are presented for the subject data acquisition effort to record certain physical properties and to establish dependent variables for defining correlation with the different characteristics that make up the physical constitution of healthy human beings in the performance of work or locomotion. Methods for recording body segment motions of the subject in one plane on the lunar gravity simulator (LGS) are reviewed. Development of a gridline system for the LGS backdrop is described. Experiments to predict the physical performance of man in a lunar suit are presented, and a computer program for biomechanics motion analysis is included. S.P.

N66-38798*# Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME III: WORK PHYSIOLOGY RESEARCH PROGRAM
Walter Kuehnegger, H. P. Roth, and F. C. Thiede [1966] 382 p refs
(Contract NAS1-4449)
(NASA-CR-66119; NSL-65-153, Vol. III) CFSTI: HC $4.25/MF $2.00 CSCL 06B

Work physiological parameters parallel to those of biomechanics were investigated to illustrate man's capability of self-locomotion and physical work under simulated lunar gravity conditions. Physiological data were recorded on respiratory rate and volume, metabolic rate, cardiovascular function, and body temperature. Information is provided on the relative bioenergetic stress levels associated with locomotion and performance of tasks. As an aid to operational task planning, physiological criteria relative to performance and tolerance limits are established. Useful information is included on the design of life support systems and future space suits. Results showed that when compared with equivalent earth gravity experiments, man's capability is generally enhanced by the reduction of gravity. This was evident in the self-locomotion experiments conducted in pressurized suits. S.P.

N66-38799*# Case Inst. of Tech., Cleveland, Ohio. Engineering Design Center.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME IV: INVESTIGATION OF LUNAR GRAVITY SIMULATION TECHNIQUES
A. J. Bartley, Roy P. Hess, R. J. Kirschensteiner, D. A. Millett, R. J. Morgen et al [1966] 55 p refs
(Contract NAS1-4449)
(NASA-CR-66120; NSL-65-153, Vol. IV) CFSTI: HC $2.50/MF $0.50 CSCL 06B

A comparison of man's energy expenditure and gait characteristics is examined during self-locomotion at various rates in earth and in simulated lunar gravity conditions. The inclined plane method of simulating lunar gravity is briefly discussed, and some attempt is made to improve the versatility of the method by refining the harness design. Efforts focused on developing a new method of simulating lunar gravity by suspending the test subject in marionette-like fashion from a steel ceiling. A new concept of a magnetic air pad was used as the support at roof level, and this enabled the subject to move freely with minimal frictional resistance. Negator springs were used to nullify five-sixths of the subject's weight. The practicality of the system was proved by construction of a 1/6 scale working model. S.P.

N66-38800*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
FLIGHT TESTS OF A WIDE-ANGLE, INDIRECT OPTICAL VIEWING SYSTEM IN A HIGH-PERFORMANCE JET AIRCRAFT
Garrison P. Layton, Jr. and William H. Dana Washington, NASA, Oct. 1966 35 p refs
(NASA-TN-D-3690) CFSTI: HC $2.00/MF $0.50 CSCL 05H

A wide-angle indirect optical viewing system was qualitatively evaluated in an F-104B aircraft as a means of providing visual reference to the pilot. Safe and acceptable performance using the indirect viewing system was demonstrated for all phases of daytime visual flight. Landings were performed in both the conventional and low lift-drag-ratio configurations. When the horizon was in the field of view, aircraft attitude sensing with the optics was satisfactory about all axes except pitch attitude in climbing flight. This degraded pitch-attitude sensing was due to the poor resolution at the bottom of the field and the lack of view to the sides. A night flight was also performed. The system, in its present form, was considered unacceptable for this use because of large light losses and degraded resolution. It was evident in the study that additional view directly to the side is required for performing circling approaches. Author

N66-38921*# Melpar, Inc., Falls Church, Va.
APOLLO PULMONARY GAS COLLECTION ASSEMBLY AND ASSOCIATED EQUIPMENT DEVELOPMENT PROGRAM Final Report
[1966] 84 p refs
(Contract NAS9-5514)
(NASA-CR-65537) CFSTI: HC $2.50/MF $0.75 CSCL 06K

Details are given on the development, fabrication, and flight qualification of a pulmonary gas collection assembly designed for collecting expired respiratory gas from flight crew members during rest, exercise, and maximum voluntary ventilation. Performance and design requirements are specified for the equipment which consisted of the pulmonary gas collection assembly, nose clip, mouthpiece, breathing valve, and interconnecting tubing. Both the storage and operational configurations are considered. A detailed description of the design approval testing and test data is included, and test procedures and results for the items subjected to the qualification tests are summarized. Flow diagrams and schematics are also included. M.G.J.

N66-38922*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
DEVELOPMENT OF PROTOTYPE MASS MEASUREMENT SYSTEM FOR SPACEFLIGHT
R. B. Maine and A. L. Weitzmann Langley Station, Va., Langley Research Center, 28 Oct.1966 93 p refs
(Contract NAS1-5999)
(NASA-CR-66174) CFSTI: HC $2.50/MF $0.75 CSCL 06B

Described is the construction and evaluation of a prototype equipment specifically designed to monitor mass changes of astronauts, and to determine the mass of spacecraft materials during orbital flight. Conceptual designs and laboratory experimental work were reviewed and a comparison analysis was conducted for optimum technique selection. Of the many systems studied, the oscillating spring-mass system was selected for hardware developments; testing of MMS hardware proved that accuracies of less than ± 0.25 pounds were possible in the weight range of 5 to 40 pounds and a ± 0.50 pound accuracy was achieved in the 41 to 250 pound range. The accuracy for human subjects was within ± 1 pound. Investigations proved that a basic MMS with minor changes can be used to determine human threshold accelerations in the range of 5 to 10 cm/sec^2. G.G.

N66-38976# Naval Training Device Center, Port Washington, N. Y.
PHYSIOLOGICAL CORRELATES OF LEARNING AND OVERLEARNING
John L. Andreassi and Patricia M. Whalen Jun. 1966 30 p refs
(NAVTRADEVCEN-IH-56; AD-636397) CFSTI: HC $2.00/MF $0.50

Two experiments were conducted to investigate physiological activity associated with original learning and overlearning of verbal materials (nonsense syllables). In experiment I, the physiological responses measured were heart rate (HR), palmar skin conductance (PSC), and galvanic skin response (GSR) during original learning, overlearning and new learning. In experiment II, the same physiological responses were recorded but original learning was followed by two overlearning phases. The results showed that: (1) There were decreases in all of the physiological measures with overlearning, i.e., further practice with mastered materials; (2) there were increases in all of the measures with new learning; and (3) further decreases in physiological activity occurred with "double overlearning" (practice with mastered materials after the overlearning phase). It was concluded that the drop in physiological activity which occurred with overlearning was due to an habituation of the physiological responses with decreased novelty in the learning materials and a reduction in apprehensiveness as the experiment progressed. Author (TAB)

N66-38995# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
APPLICATION OF CORRELATION ANALYSIS METHODS TO STUDY OF THE REACTIONS OF THE HUMAN CARDIOVASCULAR SYSTEM IN SPACE FLIGHT ABOARD A "VOSKHOD" VEHICLE
A. D. Voskresenskiy and M. D. Venttsel' *In its* Cosmic Res., Vol. III, No. 6 [1966] p 198–211 refs (See N66-38986 24-30) CFSTI: HC $6.00/MF $1.25

Segments containing 100–300 cardiac cycles were selected from telemetered ECG recordings from the three cosmonauts and used for calculating the autocorrelation and mutual correlation functions of the R-R and Q-T intervals. During the prelaunch period, all cosmonauts had shown slow undulating variations of R-R and Q-T with an oscillation period encompassing 56–64 cardiac cycles. The mutual correlation function of R-R and Q-T was approximately cosinusoidal in shape. In one case oscillations of the R-R with a period of 12–16 cardiac cycles were observed on the 14th orbit at the same pulse frequency as in the prelaunch phase. Here the Q-T interval showed practically no change, which indicates that the heart retains its efficiency under conditions of weightlessness. Slow R-R fluctuations of these types were not detected during sleep and rest periods. The slow R-R and Q-T fluctuations may be due to the influence of emotional factors on circulatory regulation. Author

N66-38996# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION OF KIDNEY FUNCTION IN THE CREW OF A "VOSKHOD" SPACECRAFT
Yu. V. Natochin, M. M. Sokolova, V. F. Vasil'yeva, and I.S. Balakhovskiy *In its* Cosmic Res., Vol. III, No. 6 [1966] p 212–219 refs (See N66-38986 24-30) CFSTI: HC $6.00/MF $1.25

The water-load method was used to investigate the water-excretion function of the kidneys of crew members. It was found that at the end of the second day after the flight, the organism's capacity for quick excretion of water drunk on an empty stomach was impaired. These changes are apparently related to readjustment of the endocrine regulation. No signs of injury to kidney tissue could be detected after the flight. Author

N66-38997# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ORIENTATION OF MAN IN SPACE
A. A. Leonov and V. I. Lebedev *In its* Cosmic Res., vol. III, No. 6 [1966] p 220–232 refs (See N66-38986 24-30) CFSTI: HC $6.00/MF $1.25

The psychophysiological mechanisms by which man orients himself under conditions of terrestrial gravity, in flight on jet aircraft simulating weightlessness, under the conditions of orbital flight and on emerging from the spacecraft into outer space are analyzed. It is reported that no disorientation was observed when a cosmonaut stepped out of his spacecraft into space. The conclusion drawn is that even more thorough medical screening and more comprehensive preparation of the cosmonauts will be necessary for the longer "walks in space" to come. Author

N66-39052# European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
THE ORGANIC COOLANT FOR EURATOM'S ORGEL PROGRAM [LE REFRIGERANT ORGANIQUE DANS LE CADRE DU PROGRAMME ORGEL DE L'EURATOM]
J. C. Leny Brussels, EURATOM, Jun. 1966 24 p In FRENCH; ENGLISH summary Presented at the Panel on use of Org. Liquids as Reactor Coolants and Moderators, Vienna, 9–13 May 1966
(EUR-2996.f) CFSTI: HC $1.00/MF $0.50

The various stages of the main research areas covered under the Program, including basic research on such materials as

organic coolant, uranium carbide, and SAP, and the construction of a zero-power reactor and of a test reactor, are briefly recapitulated. The organic liquid chosen was OM2, a mixture of terphenyl isomers in the following proportions: 22.5% ortho, 72.5% meta, and 5% para. This selection was arrived at on the basis of cost, melting point, and stability of the product. The main problems raised in connection with this coolant in relation to the project are outlined. It was concluded that terphenal mixtures are valid, and their use in conjunction with a uranium carbide fuel and SAP cladding makes it possible to reach very high specific powers. Author

N66-39054# Liege Univ. (Belgium). Labs. of Radiobiology.
CHEMICAL RADIOPROTECTIVE AGENTS [RADIOPROTECTEURS CHIMIQUES] Final Report, 1 Apr. 1964–31 Dec. 1965
Brussels, EURATOM, Jun. 1966 30 p refs In FRENCH; ENGLISH summary
(Contract EURATOM-046-64-3 BIOB)
(EUR-2992.f) CFSTI: HC $2.00/MF F$0.50

In order to provide a valid interpretation of chemical radioprotection phenomena in the entire mammal, it is essential to have a better knowledge of the pharmacology and especially the biochemical effects of sulphurated radioprotective agents. The fresh water weed *Nitella flexilis* is a highly suitable organism for certain radiobiological research. Thorough study has been carried out on the reactions of the skin of the mouse and the rat to X-rays and to radioprotectors, and research has been conducted on an Ehrlich tumor, humoral immunity, and grafting. Studies have been made on decay of free radicals after irradiation, effect of the water content, analysis of the thiol groups. It was found that cysteamine per os does not protect the mouse against continuous irradiation (Cs 137 sources). Author

N66-39100# Uppsala Univ. (Sweden). Inst. of Physiology.
RESEARCH ON THE GENESIS OF ACTION POTENTIAL IN EXCITABLE TISSUES Technical (Final) Report
Torsten Teorell 10 Jun. 1966 89 p refs
(Grant AF-EOAR-65-29)
(AFOSR-66-1510; AD-636349) CFSTI: HC $3.00/MF $0.75

The report describes research as follows: Investigations on a biophysical theory of physiological mechanoreceptors; A preliminary biophysical analysis of heart arrhythmias; Experiments on the excitability of the living heart; Investigations on the transport of ions and molecules in tightly cross-linked dextran gels. Author (TAB)

N66-39101# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety Branch.
ACCIDENTAL EXPOSURES TO IONISING RADIATIONS
H. J. Dunster, K. P. Duncan, and G. W. Dolphin Jun. 1966 27 p refs
(AHSB(RP)-R-71) CFSTI: HC $2.00/MF $0.50

CONTENTS

N66-39102# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety Branch.
LESSONS TO BE DERIVED FROM SOME IRRADIATION ACCIDENTS IN THE UNITED KINGDOM
H. J. Dunster and I. K. Legge *In its* Accidental Exposures to Ionising Radiations Jun. 1966 p 1-9 (See N66-39101 24-04)

To prevent radiological accident injury, some selected radiation exposure incidents in the United Kingdom are investigated. It is considered that radiological accidents, whether or not they result in excessive doses or injuries, are a fruitful source of information and the lessons learned from them can be valuable, not only in preventing simple repetition of the accidents, but also in improving the overall control of radiological hazards. Lessons derived from the following types of accidents are listed: handling large radioactive sources, X-ray equipment, contamination control, reactor material removal, fires, and explosions. R.Ll

N66-39103# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety
EARLY MEASURES IN THE CARE OF PERSONS ACCIDENTALLY OVEREXPOSED TO IONISING RADIATIONS
K. P. Duncan *In its* Accidental Exposure to Ionising Radiations Jun. 1966 p 10-12 (See N66-39101 24-04)

Therapeutic measures for substantial overexposure to ionizing radiation, and accidental ingestion of radioactive materials are outlined. External whole-body radiation exposures, and internal contamination are treated. R.Ll

N66-39104# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety Branch.
DOSE ASSESSMENT FOLLOWING ACCIDENTAL INTAKE OF RADIOACTIVE MATERIALS
G. W. Dolphin *In its* Accidental Exposure to Ionising Radiations Jun. 1966 p 13-20 refs (See N66-39101 24-04)

Some biological monitoring procedures which may be used for estimation of the dose following accidental intake of radioactive material are briefly reviewed. It is considered that the initial dose estimate is most important in order to decide whether therapeutic procedures should be started in order to reduce the radionuclide effect in the body. Dose assessment methods are outlined for measuring: the environment, workers' exposure, and excretion of radionuclides. Details are included on irradiation from ingestion and inhalation of insoluble and insoluble radioactive compounds, and wound contamination. R.Ll.

N66-39106# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine
HYPOXIA AND PERFORMANCE DECREMENT
William F. O'Connor, Jim Scow, and George Pendergrass May 1966 11 p refs
(AM-66-15)

The concept of "time of useful consciousness" fails to take into account the progressive decay that occurs in performance under hypoxic conditions. This study, using a means of quantitatively assessing such a decrement, presents data obtained in a series of chamber runs at 27,500 and 35,000 feet. The performance decrement functions appear to follow the arterial-oxygen-saturation curves. Author

N66-39107# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.
SELECTED FACIAL MEASUREMENTS OF CHILDREN FOR OXYGEN-MASK DESIGN
Joseph W. Young Apr. 1966 19 p
(AM-66-9)

Requirements for design of oxygen masks and other equipment for effective protection of children in high-altitude flight necessitate a new facial-measurement series. A program to meet this demand was initiated to (1) select a basic set of standard measurements, (2) define and standardize new measurements of specific structural features based on well-defined or established anatomical landmarks,

(3) conduct a series of surveys on selected representative children of all ages, and (4) determine significant dimensional ranges of facial structures for use as standardized design criteria. The new series provides 10 standard and 8 new facial measurements, all of which are dimensionally related to other common measuring points to permit a comparison with other series of facial measurements. This survey is based upon a selected population of 978 Caucasian subjects of ages 1 month through 17 years. The number of subjects in each age and sex group was controlled to assure constant sample distribution throughout the series. A continuation of this study is proposed to include representative populations for both the Negro and Mongoloid types. Author

N66-39294*# Cedars of Lebanon Hospital, Los Angeles, Calif. Inst. for Medical Research.
A TECHNIQUE FOR TESTING HEART FUNCTION BY ANALYSIS OF ITS VIBRATION SPECTRUM Progress Report
Clarence M. Agress 31 Aug. 1966 62 p refs
(Grant NsG-289)
(NASA-CR-78747) CFSTI: HC $3.00/MF $0.75 CSCL 06E

Human and animal studies were performed to obtain meaningful data describing cardiovascular performance and functioning by application of a vibrocardiogram under conditions when direct physiological measurements were impractical. Animal research centered on correlation of stroke volume measurements with the duration of the ejection and isometric periods, and the study of cardiac contractility under various types of stress. A progressive decrease of isometric intervals was found as the stroke volume enhanced, while the ejection interval increased; thus the resultant ratio closely paralleled the increasing stroke volume. Human studies were performed to assess the use of vibrocardiographic as well as other indirect methods for the evaluation of cardiovascular functions in the acutely ill patient. Special exercise studies were also included to compare stroke volume and cardiac output responses of normal and cardiac injured persons. Resulting data indicated a linear relationship between the ejection-isovolumetric ratio to stroke volume. Data from the exercise studies established a definite difference in stroke volume between healthy and cardiac injured human subjects. G.G.

N66-39301# Naval Research Lab., Washington, D. C.
AN INTERESTING CASE OF CLOSED ATMOSPHERE CONTAMINATION
R. A. Saunders *In its* Rept. of NRL Progr. Aug. 1966 p 1-4 ref (See N66-39300 24-34)

Evaluated was a completely integrated life support system in an experiment which involved maintaining five men for thirty days in a hermetically sealed environmental chamber. The members of the crew lost their appetites, became nauseated, suffered severe vomiting, and developed headaches and odd facial sensations. These symptoms together with other difficulties prompted test termination after four days. Preliminary efforts to pinpoint medically the cause of the sickness were unsuccessful. Later analysis of the chamber atmosphere identified 23 volatile compounds. Among these were mono- and dichloroacetylene. The latter compound is known to produce symptoms identical to those experienced by the chamber crew. Dichloroacetylene has since been found at low concentration in a submarine atmosphere also. A certain few of the chlorinated hydrocarbons customarily have been tolerated in most closed environmental atmospheres because of their general usefulness and relatively low toxicity. Such was the case in both of these instances. The toxicant was produced through the action of an improperly operating element of the environmental control system on one of these compounds. Author

N66-39342# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ELECTRIC SLEEP AND HYPNOSIS IN DERMATOLOGY (SELECTED PARTS)
M. M. Zheltakov, Yu. K. Skripkin, and B. A. Somov 13 May 1966 75 p refs Transl. into ENGLISH from the Book "Electroson i Gipnoz v Dermatologii" Moscow, 1963 p 114-166
(FTD-TT-65-1981; TT-66-61957; AD-636672) CFSTI: HC $3.00/MF $0.75

CONTENTS:

1. HISTORICAL SKETCH OF THE DEVELOPMENT OF THE DOCTRINE OF HYPNOSIS p 1-26 refs (See N66-39343 24-04)
2. THE THERAPEUTIC USE OF HYPNOSIS IN DERMATOLOGY p 27-61 refs (See N66-39344 24-04)

N66-39343# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HISTORICAL SKETCH OF THE DEVELOPMENT OF THE DOCTRINE OF HYPNOSIS *In its* Elec. Sleep and Hypnosis in Dermatol. 13 May 1966 p 1-26 refs (See N66-39342 24-04) CFSTI: HC $3.00/MF $0.75

The development of the doctrine of hypnosis in its physiological and psychiatric aspects is reviewed. Cerebral reflexes conditioned response, therapeutic use, hypnotic sleep suggestions, verbal suggestion versus fixed stare methods, hypnotherapy, inhibitory processes, and other concepts investigated in experiments with humans and animals are outlined. R.Ll.

N66-39344# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE THERAPEUTIC USE OF HYPNOSIS IN DERMATOLOGY *In its* Elec. Sleep and Hypnosis in Dermatol. 13 May 1966 p 27-61 refs (See N66-39342 24-04) CFSTI: HC $3.00/MF $0.75

Psychotherapy and hypnotic suggestion methods are reviewed for treating: psoriasis, eczema, alopecia areata, severe pruritus, plantar warts, hypnotherapy in obstretrical anesthesia, lichen ruber planus, urticaria, neurodermatitis, erysipeloid, polymorphic exudative erythema, and other skin diseases. R.Ll.

N66-39373*# Sandia Corp., Albuquerque, N. Mex.
DEPOSITION OF NUTRIENTS TO SURFACES OF RODAC PLATES (PART II OF MICROBIOLOGICAL STUDIES RELATING TO CLEAN ENVIRONMENTS)
John William Beakley, W. J. Whitfield, and J. C. Mashburn Sep. 1966 16 p refs
(NASA Order R-09-019-040)
(NASA-CR-78766; SC-RR-66-386) CFSTI: HC $1.00/MF $0.50 CSCL 06M

The deposition of nutrient residues onto surfaces following impressions made with Rodac plates has been observed, photographed, and quantitated. In the experiments performed, a medium residue between 20 and 50 micrograms in weights was deposited from Rodac plates onto stainless steel surfaces. Such residues were shown to be adequate to support microbial growth when such surfaces were contaminated and incubated under ideal conditions of humidity and temperature. Author

N66-39395*# IIT Research Inst., Chicago, Ill. Astro Sciences Center.
SURVEY OF BIOCLEAN FACILITIES. VOLUME I: GUIDELINES FOR EVALUATION, CONDUCT OF SURVEY, AND COST ESTIMATION FOR MODIFICATIONS
D. L. Roberts and J. Stockham Dec. 1965 51 p refs
(Contract NASr-65(06))
(NASA-CR-78753) CFSTI: HC $3.00/MF $0.50 CSCL 06T

Survey and evaluation of a number of fabrication facilities with operational, contamination controlled areas were performed to determine their suitability for the production of microbiological sterile spacecraft. A total of ten facilities visited were found to be suitable for modification to bioclean assembly areas for the 20' spacecraft, and an additional six were judged suitable for bioclean assembly of the 12' spacecraft. Laminar downflow high-bay clean rooms were not available and have to be installed. G.G.

N66-39413# Joint Publications Research Service, Washington, D. C.

MAN AND AUTOMATIC MACHINES

V. Pelipeyko 29 Sep. 1966 14 p Transl. into ENGLISH from Nauka i Tekhn. (Riga), no. 7, Jul. 1966 p 10–12

(JPRS-37897; TT-66-34325) CFSTI: $1.00

The role of cybernetic equipment in relation to the functions of man during interplanetary space travel is evaluated. Consideration is given to the capabilities and shortcomings of both methods of spacecraft control, and low reliability is stressed as the main shortcoming of complete automatic control. The problems of a soft landing on the moon, take-off, and return to earth are mentioned. It is concluded that both the psychophysiological characteristics of the cosmonaut and the technical capabilities of the automatic apparatus are necessary for different functions and individual stages of space research. S.P.

N66-39418# Production Group, United Kingdom Atomic Energy Authority, Annon (Scotland).

HEALTH AND SAFETY RESEARCH AT CHAPELCROSS

Annual Report, 1965

J. H. Martin

Various activities in the field of radiation health and safety research are reported. The metabolism of thymine was studied as a biological index of radiation exposure. Means of removing radionuclides and toxic substances from the body using strontium, plutonium, and mercury are evaluated. Pond water studies, data on effects of noise, and neutron dosimetry are mentioned. Radiocarbon dating and identification of alpha emitters occurring in marine samples through use of a proportional counter are described. S.P.

N66-39421# Atomic Energy Commission, Washington, D. C. Div. of Technical Information.

RADIOACTIVE PHARMACEUTICALS

Gould A. Andrews, Ralph M. Kniseley, Henry N. Wagner, Jr., and Elizabeth B. Anderson ed., Apr. 1966 702 p refs Proc. of the Symp. on Radioactive Pharm., Oak Ridge, Tenn., 1–4 Nov. 1965 *Its* AEC. Symp. Ser. No. 6

(CONF-651111) CFSTI: $5.00

The papers presented at this symposium are provided. The fields of biochemistry, pharmacology, radionuclide production, nuclear medicine and the radiopharmaceutical industry are all well represented Such subjects as radiochemical purity, stability, and quality control were dicussed as well as subjects such as the principles of radio nuclide labeling, methods of radionuclide production, and pharmachologic properties of localization. Most of the papers are preceeded by a brief abstract. H.S.W.

N66-39456# Washington Univ., Seattle. Psychophysics Lab.

SOME INVARIANCES OF THE ISO-SENSITIVITY FUNCTION AND THEIR IMPLICATIONS FOR THE UTILITY FUNCTION OF MONEY

Eugene Galanter and Garvin L. Holman 1 Dec. 1965 21 p refs

(Contracts NONR-477-34 ; DA-49-193-MD-2713)

(PLR-18NA, AD-637554) CFSTI: HC $1.00/MF $0.50

Four experiments were performed in which human observers reported whether or not they could detect the difference in amplitude between a pair of acoustic stimuli presented on each of several thousands of trials. In one experiment the probability that the pair differed was systematically varied. In another experiment the relative monetary value to the observer of reporting the differences was systematically varied. In a third experiment the instructions to the subject were systematically varied, and in a fourth experiment the monetary value of reporting a difference was altered by multiplying the rewards by a positive constant. In the first three experiments the iso-sensitivity function, the function that describes the relation between correct reports of a difference and false reports of a difference, was unchanged under all conditions. In the fourth experiment the absolute response probabilities of correct detections and false reports were reproduced even though five-fold changes in monetary value were made. This last result lends additional empirical support to the accumulating evidence that the utility function of money is a power function Author (TAB)

N66-39467# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SENDING THE PULSE BY RADIO

V. Trisvyatskaya 23 Feb. 1966 5 p Transl. into ENGLISH from Kommunist (Moscow), 4 Aug. 1965 p 4

(FTD-TT-65-1710; TT-66-62124; AD-637514) CFSTI: HC $1.00/MF $0.50

The biocurrents of the heart and the pulse in the finger tips are simultaneously transmitted by radio and recorded by radio-sphygmotachocardiograph. Liquid electrode-sucking-disks are used to pick up the biocurrents of the heart. Semiconductor photo-resistors placed on the finger tips are used to record the filling of the fingers by blood. A miniature lamp illuminates the fingers from the opposite side. The translucence of the fingers changes as the vessels are filled with blood, thus changing the illumination on the photoresistors and their electrical characteristics. Frequency modulation and two separate amplifiers are used to ensure that the instrument operates stably. The transmitter is fed from a battery of seven cells, each of which is no bigger than a hazel nut. The instrument of the investigator consists of a receiver (similar to an automobile receiver), a decoder and an automatic writing device. The time of propagation of a pulse wave is calculated with an accuracy up to 1/100 of a second. TAB

N66-39474# Kansas State Univ., Manhattan. Dept. of Psychology.

STUDY OF VISUAL PERCEPTION IN HUMANS AND ANIMALS. LABORATORY STUDIES OF THE EFFECTS OF STRESS ON VISUAL FUNCTION

John Lott Brown Aug. 1966 33 p refs

(Contract Nonr-3634(04))

(TR-1; AD-637553) CFSTI: HC $2.00/MF $0.50

The study is concerned primarily with three general classes of stress: (1) unusual patterns of motion to which an observer may be subjected; (2) various agents which may be ingested, inhaled, or contacted; and (3) aspects of the visual world itself, such as excessively high light levels. Emotional stresses are of obvious importance, but these are not treated extensively in the report. TAB

N66-39480# St. Louis Univ., Mo. School of Medicine.

PHOTOELECTRIC PLETHYSMOGRAPHY USING FIBER OPTICS FOR APPLICATION IN THERMAL PHYSIOLOGY

Technical Report, May 1963–Sep. 1964

Alrick B. Hertzman and Franz Flath Wright-Patterson AFB, Ohio, AMRL, Apr. 1966 14 p refs

(Contract AF 33(657)-11551; Grants PHS H-4939; PHS HE-07070)

(AMRL-TR-66-31; AD-637173) CFSTI: HC $1.00/MF $0.50

Several designs of photoelectric plethysmographs utilizing fiber optics are described. One arrangement is used for studies on the cutaneous circulation. A modification of this design was applied successfully to the oral mucosa in climate chamber experiments. With a light wire substituted for the photocell, interference filters and multiplier phototubes may be combined for spectrophotometric recording. This arrangement is particularly useful for following changes in blood content of the illuminated tissue during changes in ambient temperature. Author (TAB)

N66-39481# Kentucky Univ., Lexington. Dept. of Physiology and Biophysics.

A PELTIER EFFECT HEAT EXCHANGER APPROPRIATE FOR TEMPERATURE REGULATORY STUDIES IN SMALL ANIMALS Progress Report, 1 Nov. 1964–31 Oct. 1965

Robert E. Smith and John Krog Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Jun. 1966 13 p refs

(Contract AF 41(609)-2684)

(AAL-TR-66-6; AD-637493) CFSTI: HC $1.00/MF $0.50

A miniature heat exchanger for extracorporeal circulation systems is described: it utilizes Peltier effect semiconductors as heat pumping devices, in contrast to the traditional use of circulating water as heat source or sink. This unit has proven capable of providing rapid heating and cooling of circulating blood with minimal thermal lag. It is capable of precise control, immediate reversal of direction of heat flow and is readily adapted to automatic control. It introduces a minimum of dead space into the extracorporeal circulatory system and is readily cleaned. Author (TAB)

N66-39526*# National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY WITH INDEXES, AUGUST 1966

Sep. 1966 217 p refs

(NASA-SP-7011(28)) CFSTI: HC $1.00/MF $1.25 CSCL 06S

Annotated references, subject and personal author indexes are presented in this bibliography on aerospace medicine and biology. Emphasis is placed on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated and actual flight in the earth's atmosphere or in interplanetary space. Included are: NASA entries identified by their STAR accession numbers (N66-10000 series); AIAA entries identified by their IAA accession numbers (A66-10000 series); and LC entries identified by a number in the A66-80000 series. G.G.

N66-39553# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

PATHOLOGY OF DIRECT AIR-BLAST INJURY

Thomas L. Chiffelle Apr. 1966 55 p refs

(Contract DA-49-146-XZ-055)

(DASA-1778; AD-637212) CFSTI: HC $3.00/MF $0.50

Blast injury is a complex and very hazardous phenomenon to the biologic target. Together with effects of thermal radiations from modern nuclear weapons, blast injury (direct and indirect) appears to be accountable for the vast bulk of early deaths and casualties in nuclear explosions. This article has attempted to summarize the important clinical, physiologic, and pathologic information concerning the effects of direct air-blast injury on the biologic subject. Certain features have been emphasized in order to assist the clinical medical officer towards proper management of casualties. A brief description of pulmonary sequelae of blast injury is included for completeness. (Author) TAB

N66-39574# Lehigh Univ., Bethlehem, Pa. Center for the Information Sciences.

THE APPLICATION OF PSYCHOMETRIC TECHNIQUES TO DETERMINE THE ATTITUDES OF INDIVIDUALS TOWARD INFORMATION SEEKING AND THE EFFECT OF THE INDIVIDUAL'S ORGANIZATIONAL STATUS ON THESE ATTITUDES

Victor Rosenberg (M.S. Thesis) Jul. 1966 53 p refs

(Grants AF-AFOSR-724-66; NSF GE-2569)

(Rept.-2; AD-637713) CFSTI: HC $3.00/MF $0.50

A structured questionnaire was administered to professional personnel in industrial and government organizations, asking the subjects to rank eight information gathering methods according to their preference in given hypothetical situations. The subjects were then asked to rate the methods on a seven point scale according to (a) ease of use and (b) amount of information expected. A statistical analysis of the data from 94 subjects (52 in research, 44 in nonresearch) showed that no statistically significant differences were present in either the rankings or ratings between research and nonresearch personnel. A high significant correlation was found, however, between the preference ranking and the ease of use rating within both groups, whereas no significant correlation was found between the preference ranking and the amount of information ratings. The results of the study infer that the ease of use of an information gathering method is more important than *the amount of information expected for information gathering* methods in industrial and governmental environments, regardless of the research orientation of the users. (Author) TAB

N66-39577# Naval Radiological Defense Lab., San Francisco, Calif.

ARTIFICIAL CULTURE OF MARINE SEAWEEDS IN RECIRCULATION AQUARIUM SYSTEM

John A. Strand, III, Joseph T. Cummins, and Burton E. Vaughan 13 Jun. 1966 23 p refs

(USNRDL-TR-1030; AD-637468) CFSTI: HC $1.00/MF $0.50

Ulva as either sporeling or transplant could be cultured for periods of 3 months in closed recirculating aquarium systems. Early development of Ulva lobata sporelings proceeded normally and rapidly under conditions imposed and compared to closely related species, i.e., Ulva pertusa and Ulva lactuca. A modified Haxo-Sweeney enrichment was used, substituting B vitamins and organic phosphate for soil extract. Continuous flow ultra-violet sterilization and microfiltration were provided. pH was maintained automatically at 7.9 plus or minus 0.3, using tris buffer and gaseous CO2. Improved fluorescent illumination for 13-15 hours favored culture of sporelings and summer transplants. Irradiance *was confined to the spectrum lying between approximately* 380-725 millimicrons and amounted to 3.7 kilolux. From field observations, photoperiod appeared closely correlated to initiation of vegetative growth during early spring. Water temperature seemed to have a greater effect on the rapid maturation of gametes and zoospores Author (TAB)

N66-39591# Georgia Inst. of Tech., Atlanta. School of Chemistry.

NUCLEIC ACID CHEMISTRY: A MODEL SYSTEM FOR RIBONUCLEIC ACID DEPOLYMERIZATION Scientific Final Report, 1 Nov. 1961–30 Jun. 1966

James R. Cox, Jr. 28 Jul. 1966 5 p refs

(Grant AF-AFOSR-558-64)

(AFOSR-66-1642; AD-637564) CFSTI: HC $1.00/MF $0.50

The report summarizes evidence based on the kinetic behavior of *ribonucleic acid model systems that a strong stereoelectronic* effect operates in nucleophilic attack on phosphorus. The origin of this effect was ascribed to the geometric requirements of pl bond formation pi between phosphorus and oxygen. This theory was investigated by X-ray diffraction studies of the moleuclar structure of a suitable compound. (Author) TAB

N66-39594# Centre National de la Recherche Scientifique, Paris (France). Dept. of Cellular Neurophysiology.
NEUROPHYSIOLOGY OF THE APLYSIA GANGLION "AN ELEMENTARY BRAIN" Technical (Final) Report, Apr. 1, 1963-Dec. 31, 1965
A. Arvanitaki-Chalazonitis and Nicolas Chalazonitis (Oceanog. Inst., Monaco) Apr. 1966 20 p refs
(Grant AF-EOAR-63-114)
(AFOSR-66-0598; AD-637558) CFSTI: HC $1.00/MF $0.50

Investigations were conducted aiming at the achievement of 5 main purposes: (1) the rhythmic patterns of the bioelectric behavior and the temporal coordination of activity among given identifiable Aplysia neurons; (2)transitions evoked by synaptic activation; storage of the information; (3) the general receptor properties of the neuronal membrane; a model for a sensory coding; (4) the control exerted by the blood factors: pO2, pCO2, pH; (5) the cytological ultrastructure and cytochemical data in their relations to the foregoing themata. The results have been reported in 42 papers which are listed in this document. TAB

N66-39599# Chicago Univ., Ill. Toxicity Lab.
EFFECTS OF X-IRRADIATION ON THE HEXOBARBITAL METABOLIZING ENZYME SYSTEM OF RAT LIVER MICROSOMES Formal Report, Dec. 1, 1965-May 31, 1966
Kei-Ming Yam and K. P. Du Bois Jun. 1966 33 p refs
(Contract AF 41(609)-2977)
(AD-637574) CFSTI: HC $2.00/MF $0.50

A study was conducted on the influence of X-ray on the development of a hepatic microsomal oxidase that catalyzes the oxidative detoxification of hexobarbital. Exposure of 23-day old male rats to 400 r of X-ray completely inhibited the rapid increase in enzyme activity that normally occurs at this age in male rats. After three weeks following radiation exposure, reversal of the inhibition was observed. Exposure of only the heads of male rats also resulted in inhibition of the enzyme development in the liver, and hypophysectomized, unirradiated rats failed to exhibit the normal increase in enzyme activity. These findings resembled the results of previous investigations in this laboratory on other microsomal enzymes and provided further evidence that radiation acts on some process involved in the synthesis of increased enzyme activity in the livers of male rats through an indirect mechanism probably involving hormonal regulation of microsome enzyme synthesis. X-irradiation (400 r) also inhibited the synthesis of the hexobarbital oxidizing enzyme in the liver of partially hepatectomized male rats. A prolonged duration of action of hexobarbital in irradiated young male rats and hepatectomized, adult rats demonstrated the in vivo effects of inhibition of enzyme synthesis on drug metabolism Author (TAB)

N66-39625# Joint Publications Research Service, Washington, D. C.
ELECTROLYTE CONTENT IN BIOLOGICAL FLUIDS IN HYPOXIA AND THE FUNCTION OF THE COCHLEA
G. M. Komarovich, M. S. Pluzhnikov, and R. I. Titova 19 Sep. 1966 10 p refs Transl. into ENGLISH Dokl. Akad. Nauk SSSR (Moscow), v. 165 no. 6, 1966 p 1488-1490
(JPRS-37688; TT-66-34116) CFSTI: $1.00

Since the ear has been ascribed relative stability under hypoxia conditions compared with other sensory organs, a study was conducted on the action of oxygen deficiency in that organ. Electrolytes in the biological fluids of 27 cats were determed by flame photometry. Data are tabulated for the content of potassium and soidum electrolytes in the perilymph, cerebrospinal fluid, and blood serum in the normal state, and under conditions of pronounced hemic hypoxia. Microphone currents of the cochlea of a cat in the normal state and in hemic hypoxia are compared when an auditory signal of 1000 cps is supplied at an intensity of 100 dB. R.LI.

N66-39632# Dunlap and Associates, Inc., Santa Monica, Calif. Wester Div.
A RATIONALE FOR EVALUATING VISUAL LANDING AIDS: NIGHT CARRIER RECOVERY Final Report, 1 Mar. 1963-1 Mar. 1964
Richard P. Winterberg, Clyde A. Brictson, and Joseph W. Wulfeck Mar. 1966 141 p refs
(Contract Nonr-4118(00))
(AD-637508) CFSTI: HC $4.00/MF $1.00

A primary conclusion of the study is that no objective measure of the quality of an approach and landing other than the untimely and inadequate one of accident rate exists for use as a criterion in evaluating visual landing aids. In the absence of such a criterion an analysis of the night carrier aircraft recovery operating procedure and environment was conducted to determine the visual characteristics of the carrier/pilot/aircraft subsystem interaction. The hypothesis emerged that the visual information available to the night carrier pilot is more similar to that available from an instrument display than it is to the information provided by daylight contact flight. The hypothesis was tentatively supported by an analysis of pilot opinion data. Therefore, sets of criteria applicable to visual landing aid evaluation were developed from those which have been established for visual displays in general. Those criteria, while useful, are qualitative and to a certain extent speculative Author (TAB)

N66-39653# Naval Radiological Defense Lab., San Francisco, Calif.
TEMPERATURE ADAPTATION OF THE GROWTH AND DIVISION PROCESS OF *TETRAHYMENA PYRMIS*. II: RELATIONSHIP BETWEEN CELL GROWTH AND CELL REPLICATION
Peter Schmid 13 Jun. 1966 35 p refs
(USNRDL-TR-1031; AD-637150) CFSTI: HC $2.00/MF $0.50

Replication rates and volume distributions of Tetrahymena pyriformis GL determined with a commercially available electronic cell counter are reported for several temperatures. Tetrahymena pyriformis GL was cultured in proteose peptone yeast extract medium at 28.0, 30.8, 32.5, and 33.9C. During the period of exponential cell replication at all temperatures, the volume distribution was constant, lognormal and the standard deviation from the median volume was temperature independent. This indicates a steady state of balanced growth at 28.0, 30.8, and 32.5 degrees during exponential cell replication. It is demonstrated that the knowledge of volume distribution and generation time is insufficient for calculating rates of cell growth between divisions unless the parameters for the momentary volume distribution can be measured independently. Statistical evaluation of data from the literature confirms previously reported findings which indicate that growth of Tetrahymena over extended periods of the division cycle is approximately exponential and not linear. The previous proposition that control mechanisms for growth of Tetrahymena and Paramecium are different, is thus unnecessary. A new model, which describes the control of cell growth and cell replication is suggested. The model accounts for the lognormal distributions of generation times and volumes as well as the nearly exponential rate of growth between divisions. The mean rate of cell replication which decreases with increasing temperature, shows a negative correlation with the median log volume of the proposed growth model and furthermore indicates that the growth rate is to a large extent independent of cell replication Author (TAB)

N66-39655# Cambridge Univ. (England). Psychological Lab.
VISUAL PERCEPTION OF MOVEMENT Interim Scientific Report No. 1, 1 Apr. 1965-31 Mar. 1966
R. L. Gregory and J. A. M. Howe 21 Jun. 1966 77 p refs
(Grant AF-EOAR-65-62)
(AFOSR-66-1532; AD-637510) CFSTI: HC $3.00/MF $0.75

The research includes: (a) Investigation of the use of pitch of a sound as a distance cue; (b) investigation of the maintenance of retinal fusion as an object moves in depth; (c) description of the apparatus developed for moving observers at constant velocity; (d) investigation of apparent depth and perspective set up by a line at different inclinations from the vertical; and (e) measurements of the magnitude of the Ponzo illusion for different positions of the horizontal lines within the oblique lines. Author (TAB)

N66-39658# Honeywell, Inc., St. Paul, Minn. Systems and Research Div.

A STUDY OF VISUAL SEARCH USING EYE MOVEMENT RECORDINGS Semiannual Progress Report, 1 Jan.–30 Jun. 1966

L. G. Williams 30 Jun. 1966 8 p ref

(Contract Nonr-4774(00))

(Rept.-12009-IR2; AD-637281) CFSTI: HC $1.00/MF $0.50

The report is a summary description of the progress during the first six months of the second year of the visual search program. The first study of 1966 is an investigation of the use of size information for acquiring targets. This is nearing completion. The second study is an investigation of the use of color information. It is in an advanced stage of preparation. The objective in both experiments is to develop a framework for predicting the precise proportions of fixations on objects in different size and color categories as a function of the target specification and field composition Author (TAB)

N66-39671# Minneapolis-Honeywell Regulator Co., Minn. Military Products Group.

RESEARCH ON COMPLEX PERCEPTUAL MOTOR SKILLS Final Report

Carl A. Silver 20 Jul. 1960 34 p refs

(Contract Nonr-3011(00))

(RR-1520-TR1; AD-637260) CFSTI: HC $2.00/MF $0.50

An apparatus was constructed which produces any selected correlation in the range −1.0 to +1.0 by mixing three random time functions. Three experiments, each using the same ten subjects, were completed using this apparatus. Thresholds for the perception of positive and negative correlations were obtained using both a two-choice and a three-choice design. A normal ogive is a satisfactory fit to the data. Author (TAB)

N66-39680# Stanford Univ., Calif. Graduate School of Business.

PERCEPTION OF LEADERSHIP IN SMALL GROUPS: PERSONALITY DIFFERENCES IN DISCUSSION GROUP BEHAVIOR

Thomas W. Harrell Aug. 1966 39 p refs

(Contract Nonr-225(62))

(TR-11; AD-637254) CFSTI: HC $2.00/MF $0.50

The problem was to determine whether there were personality differences between choices following small group discussions. Such personality differences, if they existed, could predict the emergence of leadership behavior in initially leaderless groups. There were 26 personality differences significant at the .05 level or higher between the extremes in MBA five or four man discussion groups on either number of times talked, or sociometric choices of leadership, or guidance, or best ideas, or being liked. There were 14 personality differences significant at the .05 level or higher in the combination of MBA and Executive Development Program five man groups on either guidance, best ideas, or being liked. Ascendance and General Activity were higher for the number I men in Guidance in each of the three sets of groups, MBA five man groups, MBA four man groups, and combined Executive Development Program and MBA five man groups. Individual Background Survey scores were higher for number I MBA five man groups on Leader and Guidance, and four man groups on Guidance and Best Ideas. TAB

N66-39683# Human Engineering Labs., Aberdeen Proving Ground, Md.

TARGET OBSCURATION FROM INTERVENING LIGHT SOURCES: A PRELIMINARY INVESTIGATION

Andrew J. Eckles III and Thomas A. Garry May 1966 20 p

(TN-2-66; AD-637720) CFSTI: HC $1.00/MF $0.50

The preliminary experiment examined how an intervening light source affects target obscuration. More specifically, this experiment estimated how target obscuration depends on variables such as target brightness, intensity of intervening light source, target range, and range of the intervening light source These results, while limited to data from two subjects, point the way to more detailed and sophisticated experimentation. (Author) TAB

N66-39688*# Hazleton Labs., Falls Church, Va.

RADIOISOTOPIC BIOCHEMICAL PROBE FOR EXTRATERRESTRIAL LIFE Fifth Annual Progress Report

Gilbert V. Levin and Norman H. Horowitz Oct. 1966 116 p refs

(Contract NASr-10)

(NASA-CR-78991) CFSTI: HC $4.00/MF $1.00 CSCL 06B

Instrumentation and field testing of the Mark IV model of the Gulliver radioisotopic biochemical probe for extraterrestrial life are described. Despite the good results of the field test, the model demonstrated a sensitivity exceeding that of the current instrument by approximately 2-1/2 orders of magnitude. An account is given for this loss of sensitivity, which is a trade-off for various advantages in reliability, simplicity, and weight-saving aspects of the instrument. A statistical summary for the five-year Gulliver program is presented. Results obtained from tests of all types, except those in which mechanical failure or contamination of the controls occurred, are included. Factors influencing the instrumentation such as size, mass, sterilization, and launch, space, and planetary environments are considered. The design and fabrication of the mechanical and electronic components is also discussed. S.P.

N66-39689*# Chicago Univ., Ill.

INTEGRATED RESEARCH AND TRAINING IN SPACE-MOLECULAR BIOLOGY Semiannual Progress Report, Apr. 1–Sep. 30, 1966

Humberto Fernandez-Moran [1966] 15 p refs

(Grant NsG-441-63)

(NASA-CR-78937) CFSTI: HC $1.00/MF $0.50 CSCL 06F

Continuing efforts are reported for a research program on electron microscopy with high-field superconducting solenoid lenses. Development of a cryo-electron microscope optical bench system and a special superconducting objective lens in liquid helium cryostat is described. Other experimentation included systematic use of ultrathin carbon films prepared by evaporation in ultrahigh vacuum and examination by electron microscopy and electron diffraction of materials collected by the Luster sounding rocket. Also reported is the continued maintenance of the special electron microscope laboratories with clean room facilities. S.P.

N66-39697*# California Univ., Los Angeles. Space Biology Lab.

INTRINSIC ORGANIZATION OF CEREBRAL TISSUE IN ALERTING, ORIENTING AND DISCRIMINATIVE RESPONSES

W. R. Adey [1966] 58 p refs

(Grants NsG-237; NsG-502; NsG-505)

(NASA-CR-78880) CFSTI: HC $3.00/MF $0.75 CSCL 06P

This review considers the gamut of neural organization, ranging from subcellular events in the genesis of intracellular waves, to the patterns in scalp EEG records characterizing a population of human subjects in states of focused attention and visual discrimination. A tricompartmental model of cerebral tissue is described, with neuronal, neuroglial and extracellular divisions. The role of macromolecular systems at the neuronal surface and

in the intercellular fluid is considered. Evidence is presented that mucoproteins and mucopolysaccharides may be responsible for net fixed charges at the cell surface, and may thus play a role in ionic fluxes across the membrane. Divalent cations, such as calcium, may modify these macromolecular configurations. Impedance changes in cerebral tissue accompanying alerting, orienting and discriminative responses are described, with emphasis on their regional distribution, and relationship to levels of learning. Author

N66-39700*# Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
THE DEVELOPMENT OF SPECTRO-SIGNATURE INDICATORS OF ROOT DISEASE ON LARGE FOREST AREAS Annual Progress Report
John F. Wear 30 Sep. 1966 43 p refs
(NASA Order R-09-038-002)
(NASA-CR-78871) CFSTI: HC $2.00/MF $0.50 CSCL 02F

Research employing remote sensing techniques in the visible, near infrared, and thermal infrared portions of the electromagnetic spectrum has been attempted with aerial sensors to discriminate differences in the appearance of healthy and *Poria weirii* root rot infected Douglas-fir trees. A spectrometric analysis of foliage from the tops of 45 sample trees that represent three tree condition classes, three age classes, and three seasons of the year is considered. Special equipment and aerial sampling techniques were designed and developed to implement the collection of the tree top samples. The use of special aerial photography and thermal infrared radiometer readings is also discussed in this report. Author

N66-39701*# California Univ., Los Angeles. School of Medicine.
THE RENAL LYMPHATICS: AN IMPORTANT FLUID TRANSPORT SYSTEM
A. T. K. Cockett, R. T. Kado, A. P. Roberts, and R. S. Moore [1966] 14 p refs Prepared Jointly with Harbor Gen. Hosp.
(Grants NsG-237-62; NIH HE-09834-02)
(NASA-CR-78876) CFSTI: HC $1.00/MF $0.50 CSCL 06E

Results are presented from studies of enzymes and hormonal concentrations in renal lymph fluid, determination of antibiotic concentrations within the renal interstitium, and the measurement of respiratory gases within renal lymph fluid. Renin-Angiotensin levels on an equal volume basis were found in higher concentrations in renal lymph. Antibacterials and their distribution in the renal lymph, blood and urine are listed. Oxygen tension in renal lymph exceeded the corresponding arterial levels. Implicatic s of these levels are discussed. The data obtained are summarized in graphs and charts. H.S.W.

N66-39702*# California Univ., Los Angeles. School of Medicine.
URINARY REFLUX—THE PHYSICIAN'S DILEMMA
A. T. K. Cockett [1963] 14 p refs Prepared Jointly with Harbor Gen. Hosp.
(Grant NsG-237-62)
(NASA-CR-78877) CFSTI: HC $1.00/MF $0.50 CSCL 06E

A review of published literature on urinary reflux—vesicoureteral regurgitation of urine into the renal pelvis and calyces—is presented. Techniques to demonstrate reflux are examined including the importance of intravesical pressure monitoring before and during micturition, and radiographic techniques. A standardized radiographic method is discussed. The most frequent cause of urinary reflux is the presence of bladder outlet obstruction. A review of several clinical series with reflux showed that bladder neck obstruction accounts for about 75% of cases in the pediatric age group. Patients with reflux are grouped into three classes: (1) patients with high intravesical pressure, (2) patients with reflux at low intravesical pressures but high urinary volumes, and (3) patients with reflux at low intravesical pressures and low volumes. Careful evaluation and prompt treatment is emphasized and it is stated that one should separate mechanical causes from physiological factors affecting bladder function since the neurogenic bladder is handled differently. H.S.W.

N66-39710*# Public Health Service, Phoenix, Ariz. Communicable Disease Center.
[RESEARCH ON MICROBIOLOGICAL STERILIZATION PROBLEMS] Quarterly Report, Jul.-Sep. 1966
M. H. Goodwin, Jr. 12 Oct. 1966 35 p *Its* Rept.-15
(NASA Order R-137)
(NASA-CR-78984) CFSTI: HC $2.00/MF $0.50 CSCL 06E

Continuing research studies on ***Bacillus subtilis*** var. ***niger*** and other microorganisms are reported. Emphasis was placed on the methyl methacrylate system to determine (1) the effect of polymerization and subsequent storage on survival of spores of ***B. subtilis*** var. ***niger***, and (2) the spores' die-away rates. In experiments using ultrasonic energy for recovering microbial contaminants, primary consideration was given to testing surfaces with natural contamination resulting from human handling or aerial fallout and also aerosolized spores of ***B. subtilis*** var. ***niger***. Air samples were taken in two operating room with slit samplers and high levels of airborne viable particles (171/cu ft) were found. In developing a technique for injuring bacterial spores with dry heat, typical destruction curves were obtained. Continued research is outlined on assessing microbial contamination levels on lunar spacecraft and assembly environments. N.E.N.

N66-39744# Martin Co., Baltimore, Md. RIAS Div.
AN INVESTIGATION OF THE CHEMICAL MECHANISM OF THE LIGHT REACTION OF PHOTOSYNTHESIS Final Report, Dec. 1, 1964-Jul 31, 1966
Martin Schwartz Aug. 1966 15 p refs
(Contract Nonr-4753(00))
(NR-108-609; AD-637243) CFSTI: HC $1.00/MF $0.50

The report deals with research concerning the mechanism of energy transformation and electron transport in photosynthesis. The research program encompassed a study of the mechanisms of photon absorption and distribution and of electron transport with concomitant phosphorylation Author (TAB)

N66-39751 Naval Radiological Defense Lab., San Francisco, Calif.
EVIDENCE FOR PLURIPOTENTIALITY OF MARROW STEM CELLS: MODIFICATION OF TISSUE DISTRIBUTION OF IN VIVO I^{125}UdR LABELED TRANSPLANTED MARROW
Bernard J. Bryant and Leonard J. Cole 9 Jun. 1966 32 p refs
(USNRDL-TR-1028; AD-637782) CFSTI: HC $2.00/MF $0.50

Mice were exposed to a lethal dose of X-radiation (900 rad) and transfused with 5,000,000 syngeneic bone marrow cells. Subgroups of these mice were either made polycythemic, anemic or served as controls. Regenerative activity in the hemopoietic and lymphopoietic tissues was assessed by flash-labeling with I125-iododeoxyuridine. The evidence based on the incorporation of I125-labeled iododeoxyuridine into DNA, organ weights, histological and H3-thymidine rediautographic data suggests that stem cells in the bone marrow of adult mice may contain both hemopoietic and lympho-/plasmacytopoietic potentialities. The methodology and some possible objections to the interpretation of the data are discussed, and future work is indicated Author (TAB)

N66-39779# Naval School of Aviation Medicine, Pensacola, Fla.
EFFECTS OF SIMULATED HIGH ALTITUDE ON LEFT CIRCUMFLEX CORONARY FLOW, BLOOD PRESSURE, CARDIAC OUTPUT, AND MYOCRADIAL METABOLISM IN THE UNMEDICATED GREYHOUND DOG

Le Roy S. Wirthlin and E. Peter Beck 18 May 1966 28 p refs
(NAMI-965; AD-637583) CFSTI: HC $2.00/MF $0.50

The effects of simulated high altitudes on phasic coronary artery flow, central aortic pressure and flow, and myocardial metabolism were studied in unmedicated greyhound dogs 1-2 weeks after implantation of sensing devices. The adaptation of coronary flow to hypoxia was medicated through an increase in heart rate, coronary vasodilation, and increase in mean pressure. Coronary sinus pO2 was found to correlate highly with arterial pO2. The linear relationship of coronary flow to oxygen usage persisted during hypoxia. Mayer waves with rhythmic fluctuations in coronary flow were encountered Author (TAB)

N66-39790# School of Aerospace Medicine, Brooks AFB, Tex.
FACTORS IN JOB-SATISFACTION: ANALYSIS OF SPONTANEOUS COMMENTS
George K. Cantrell, Bryce O. Hartman, and Lewis S. Sims, Jr. (Mil. Airlift Command, Scott AFB, Ill.) Jun. 1966 18 p ref
(SAM-TR-66-57; AD-637862) CFSTI: HC $1.00/MF $0.50

Comments, spontaneously entered on 2122 questionnaires administered to maintenance airmen in 20 different military units in the Far East, Europe, and the Continental United States, were analyzed. The 4941 comments were assigned to one of 32 different categories and to one of three different levels of emphasis. The analysis supported an earlier finding that an airman's immediate supervisor has a greater capacity to affect his level of job-satisfaction than any other single factor. The more significant problems, including promotion, pay, duty time-time off, duty assignments, poor supervision, management, recognition, living conditions, and supply, are discussed in reference to airmen and to NCO's. The analysis revealed that as an airman changed his level of emphasis in making a comment, his ranking of the comment areas also changed. Author (TAB)

N66-39793# School of Aerospace Medicine, Brooks AFB, Tex.
EVALUATION OF TWO PERCENT GOLD VISOR
John A. Carpenter and Everett O. Richey Aug. 1966 11 p
(SAM-TR-66-71; AD-638623) CFSTI: HC $1.00/MF $0.50

A flight evaluation was conducted to determine if use of the 2% gold visor in daylight hours degraded performance of flight duties. Thirteen TAC instructor pilots flew 17 sorties, representative of TAC mission profiles, in the F4C aircraft at Davis-Monthan AFB, Ariz. Slightly diminished vision under cloudy conditions was experienced by some individuals. Satisfactory completion of the missions was accomplished, however. The 2% gold visor is recommended for use in TAC aircraft during daylight hours for eye protection from nuclear detonations Author (TAB)

N66-39794# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.
METHODS USED IN A CONTINUING STUDY OF TEMPERATURE REGULATION Phase Report
F. H. Jacobson, Russell D. Squires, R. J. Zabelicky, and W. K. Border 31 Dec. 1965 30 p refs
(NADC-MR-6514; AD-638672) CFSTI: HC $2.00/MF $0.50

Techniques for ablating, as well as for chemical and thermal stimulation and inhibition of the preoptic region of the cat forebrain are described. Methods of measuring various parameters of temperature regulation are also described, and the errors of the measurements assessed Author (TAB)

N66-39796# School of Aerospace Medicine, Brooks AFB, Tex.
POSTIRRADIATION CREATINURIA IN *MACACA MULATTA* PRIMATES
I. G. Peters and H. E. Hamilton Aug. 1966 12 p refs
(SAM-TR-66-21; AD-638622) CFSTI: HC $1.00/MF $0.50

Macaca mulatta primates irradiated by Co^{60} gamma rays in three groups of four animals each to dose levels of 2000, 4000, and 6000 rads showed marked creatinuria. Refinement of the fluorometric determination of creatine based on the reaction of ninhydrine with creatine in alkaline media has been achieved. Interfering guanido compounds calculated on a creatine equivalence constituted from unmeasurable amounts to approximately 10% of the total creatine in samples containing a small amount of creatine. Author (TAB)

N66-39797# Marion (Jerry B.), Silver Spring, Md.
FACILITIES FOR HIGH-INTENSITY NEUTRON IRRADIATION
Jerry B. Marion Bethesda, Md., Armed Forces Radiobiol. Res. Inst., Jan. 1966 62 p
(Contract DA-49-146-XZ-230)
(AFRRI-CR66-4; AD-637458) CFSTI: HC $3.00/MF $0.75

An analysis is made of the possibilities of producing high-intensity beams of neutrons with energies other than 14 MeV. It appears that the 3-MV accelerators which are likely to be available within the next few years will be capable of delivering beams of charged particles with currents up to about 15 mA. With this beam limitation it will not be possible to deliver a sample irradiation flux of more than 10 to the 11th power neutrons/sec, if monoenergetic neutrons are required. On the other hand, present capabilities of higher energy accelerators (e.g., 100-MeV cyclotrons) will permit the generation of approximately 10 to the 15th neutrons/sec. Since the majority of these neutrons are emitted into a very narrow forward cone, it would be possible to utilize almost the entire neutron output for irradiation purposes. For biological studies in which the maximum possible neutron flux is required, it appears that an accelerator which will yield beam energies considerably in excess of 3 MeV will be required. TAB

N66-39798# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
ELECTROPHORETIC SEPARATIONS ON ACRYLAMIDE GELS: DISC ELECTROPHORESIS Final Report
Leandro Rendon Dec. 1965 36 p refs
(AMRL-TR-65-202; AD-637228) CFSTI: HC $2.00/MF $0.50

Disc electrophoresis, a new method for fractionating serum proteins and enzymes developed by Ornstein and Davis (Ann. N. Y. Acad. Sci. V121 P321 1964), possesses great sensitivity, speed and reproducibility while requiring a sample as little as 3 microliters in routine separations. The technique as adapted and standardized for use in the Toxic Hazards Branch, Aerospace Medical Research Laboratories, for serum protein and Lactic Dehydrogenase (LDH) isozyme separations is presented along with suggestions for making the apparatus needed to perform disc electrophoresis. Author (TAB)

N66-39799# School of Aerospace Medicine, Brooks AFB, Tex.
FACTORS IN JOB-SATISFACTION
George K. Cantrell, Bryce O. Hartman, and Lewis S. Sims, Jr. (Mil. Airlift Command, Scott AFB, Ill.) May 1966 41 p ref
(SAM-TR-66-46; AD-637861) CFSTI: HC $2.00/MF $0.50

A 44-item questionnaire, covering twenty eight management problem areas, was administered to personnel at twenty different maintenance units in the Far East, Europe, and the Continental United States. Completed questionnaires from 2122 airmen were used to evaluate the relationship between each problem area and job-satisfaction. The analysis showed that job-satisfaction is most affected by those problems that could be controlled or corrected by the immediate supervisors and least affected by those problems which have to be solved at levels farther up the chain of

command. Supporting evidence was obtained from interviews and a special psychiatric study. Author (TAB)

N66-39801# Honeywell, Inc., St. Paul, Minn. Systems and Research Div.

INTRASPECIES BIOLOGIC AND BEHAVIORAL VARIABILITY

Stirling P. Stackhouse Brooks AFB, Tex., School of Aerospace Med., Jun. 1966 30 p refs

(Contract AF 41(609)-2937)

(SAM-TR-66-58; AD-637946) CFSTI: HC $2.00/MF $0.50

Parameters are selected which will be useful in studying intraspecies biologic and behavioral variability for man and rhesus monkeys. The variability data can be used to form subgroups of men and monkeys useful in subsequent radiation experiments. The criteria used in selecting the parameters for measurement were high variability, man-monkey variability correlation, physiologic significance, and radiation sensitivity. (Author) TAB

N66-39823# Production Group, United Kingdom Atomic Energy Authority, Annon (Scotland).

THE BIOLOGY OF THE SOLWAY FIRTH IN RELATION TO THE MOVEMENT AND ACCUMULATION OF RADIOACTIVE MATERIALS. PART II: THE DISTRIBUTION OF SEDIMENTS AND BENTHOS

E. J. Perkins and B. R. H. Williams 1966 65 p refs

(PG-587(CC)) HMSO: 10s

Data for the distribution of sediments and benthos in relation to insoluble or particulate radioactive nuclides is presented. The mechanisms of transport of slit and associated radioactivity in the N.E. Irish Sea and the Solway Firth are shown to be primarily due to the differential between flood and ebb tide velocities consequent upon distortion of the tidal wave. A possible reason for the fundamental difference between marshes bordering upon the Irish Sea and those of the east coast of England is discussed. Author

N66-39840# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

SOME CONSIDERATIONS ON EYE HAZARDS WITH LASERS

J. J. Vos 1966 26 p refs

(TDCK-46027; IZF-1966-4) CFSTI: HC $2.00/MF $0.50

Eye hazards by laser radiation are described and discussed on the basis of experimental data on animals, theoretical consideration on heat dissipation, and recent data on ocular imagery. Critical doses are determined and thicknesses calculated for protective filters. Tentative safety prescriptions, on this basis, conclude the report. Author

N66-39846# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

OPTIMUM ANGULAR ACCELERATIONS FOR CONTROL OF A REMOTE MANEUVERING UNIT Technical Report, Jun.–Aug. 1965

Herbert J. Clark Mar. 1966 36 p refs

(AMRL-TR-66-20; AD-637170) CFSTI: HC $2.00/MF $0.50

Six subjects successfully reoriented the attitude of a simulated remote maneuvering unit (RMU) using an on-off acceleration command control system. RMU attitude was determined solely by viewing the space scene being televised by the RMU. That scene consisted of a spherical target, the earth horizon, and a star background, all of which interacted realistically as a function of the subjects RMU control inputs. The RMU was controlled under three conditions of angular acceleration: 4, 8, and 12 degrees/sec sq. Four deg/sec sq. resulted in least expenditure of fuel and most accurate rate control without a sacrifice in time. These results and subjects preference data recommended pitch, yaw, and roll accelerations of 4 deg/sec sq. when using an on-off acceleration command control system. Subjects relied primarily on the orientation of the earth horizon for RMU roll reference. Because the horizon was not always in view, errors in roll were significantly greater than those in pitch and yaw. This result may have been an artifact of the simulation; too few stars were simulated to allow their use as an adequate roll reference. Simultaneous or separate attitude control resulted in equally effective RMU reorientation. Similarly, pilots and nonpilots performed equally well. However, pilots can usually be trained faster than nonpilots. (Author) TAB

N66-39850# Antioch Coll., Yellow Springs, Ohio.

A STUDY OF ONE-HANDED LIFTING Final Report

John T. Mc Conville and H. T. E. Hertzberg (AMRL) Wright-Patterson AFB, Ohio, AMRL, May 1966 24 p refs

(Contract AF 33(616)-6792)

(AMRL-TR-66-17; AD-637764) CFSTI: HC $1.00/MF $0.50

The research study is intended to aid in establishing realistic criteria for size and weight of industrial packages. Size and weight, objective and subjective factors that potentially affect human weight-lifting, and proper approach to the design of industrial loads are discussed. Additional programs of investigation that would clarify other aspects of the problem are outlined. This study examined the interaction of two variables--weight and width--of one--handled, symmetrical boxes that a sample of 30 adult males were able to lift from the floor to a table 30 inches high. No carrying was invvolved. The subject sample was chosen to be a reasonable representation by height and weight of the U. S. Air Force population. All lifts were made with the preferred hand under ideal laboratory conditions. Box width was varied from 6 to 32 inches. The maximum weight of box that subjects were able to lift varied linearly, but inversely, with the width of the box. From this sample, the maximum weight that 95% of the population would be able to lift--but not necessarily carry--can be expressed by a linear equation: Y = 60 -X, were Y is the weight (in pounds) of the package to be lifted and X is the width (in inches). The numerical values of this formula provide a recommended upper limit on the design of industrial or military equipment which must be lifted under ideal conditions. If the expected conditions of use are less than ideal, or if carrying for appreciable distances is likely to be necessary, reasonable reductions in weight, or size, or both should be made by the manufacturer. (Author) TAB

N66-39855# Chicago Medical School, Ill. Dept. of Biochemistry.

ABSORPTION SPECTRA OF PEPTIDES AND PROTEINS IN THE ULTRAVIOLET Final Report, 1 May 1955–31 Dec. 1964

Leo J. Saidel 15 Jul. 1966 13 p refs

(Contract Nonr-1655(01))

(AD-637180) CFSTI: HC $1.00/MF $0.50

By various methods residue spectra were estimated for all of the amino acid residues commonly occurring in proteins and tentative comparisons of summed residue spectra with measured protein spectra were made for glucagon, insulin, ribonuclease, muramidase and bovine serum albumin at 205 millimicrons and 230 millimicrons. All of the calculated molar extinction coefficients at 205 millimicrons are within the range of 1.04 to 0.89 of the observed values whereas the corresponding rations at 230 millimicrons are within the range of 0.98 to 0.66. At neither wavelength do the differences correlate well with the helical content of the proteins determined by rotatory dispersion Author (TAB)

N66-39858# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
HEMODYNAMIC AND METABOLIC RESPONSES OF INFUSHED LOW MOLECULAR WEIGHT DEXTRAN Technical Report, Nov. 1965–Apr. 1966
Eugene Evonuk Jun. 1966 17 p refs
(AAL-TR-66-9; AD-637473) CFSTI: HC $1.00/MF $0.50

Thirteen series of experiments were conducted to determine some hemodynamic and metabolic responses of infused LMD (low molecular weight dextran, 40,000) in rats. Oxygen consumption, respiratory quotient, circulating histamine levels, arterial and venous pressure, cardiac output and volumes percent of blood PO_2 and PCO_2 were determined before and at various intervals after LMD infusion. The infusion of LMD resulted in a significant decrease in oxygen consumption, increase in respiratory quotient, increase in circulating histamine, decrease in arterial and venous pressures, a decrease in cardiac output, and decrease in venous PO_2 and arterial PCO_2. From these responses of infused LMD it as concluded that the metabolic processes are uninhibited at the peripheral cellular level and that the reduction in metabolic rate was due to a marked peripheral hemostasis and failure of the circulatory system to supply the oxygen demand. Author (TAB)

N66-39860#Illinois Univ., Urbana. Aviation Psychology Lab.
THE FORGETTING OF INSTRUMENT FLYING SKILLS AS A FUNCTION OF THE LEVEL OF INITIAL PROFICIENCY
Robert F. Mengelkoch, Jack A. Adams, and Charles A. Gainer Port Washington, N. Y., Naval Training Device Center [1965] 132 p refs
(Contract N61339-126)
(NAVTRADEVCEN-71-16-18; AD-637570) CFSTI: HC $4.00/MF $1.00

The four-months interval of non-practice resulted in considerable decrements in the discrete procedural aspects of flight. If these decrements occurred in actual flying situations they would have grave consequences for operational capability and safety. As for the continuous flight control aspects of flight, forgetting occurred only occasionally and in amounts considered of little practical significance by the investigators. The differential effect of non-practice on procedural versus flight control tasks was observed even where the two types of tasks were carried on simultaneously. In most instances there was no relationship between amount forgotten and initial level of flying proficiency. That is, at the end of the four-months interval the high initial training group retained its superiority over the intermediate initial training group. Author (TAB)

N66-39863# Naval Medical Research Inst., Bethesda, Md.
AN EVALUATION OF THE FOAMED NEOPRENE "DIVER'S WET SUIT" AS A SURVIVAL GARMENT FOR HELICOPTER AIRCREWS Research Report no. 7
Elizabeth Reeves, Melvin P. Stephens, and Edward L. Beckman Jul. 1966 35 p refs
(MF-011-99-1001; AD-637153) CFSTI: HC $2.00/MF $0.50

The type of flights performed by helicopters require particular garments for their aircrews as follows: (1) Water entry by aircrew is by way of water collision so that there is a high probability of damage to the survival garment; (2) The short flight radius of the helicopter ensures that the time-distance from a potential rescuer should be relatively short, so that rescue should be expected in less than 4 hours; (3) The suit must be wearable without an air ventilated suit for cooling and still be usable in high cockpit temperatures up to 90F; and, (4) The low altitude of flight allows no time to don or zipper up a survival garment so that there should be no significant penalty for entering the water with the garment partially unzipped. Laboratory experiments using a variety of antiexposure assemblies demonstrated that the 3/16 inch. foamed neoprene wet suit, mittens, hood, and insulated rubber thermal boots provided the most comfortable and efficient configuration. Tolerance times were established for such clothing in 40, 50, and 60F. water Author (TAB)

N66-39866# Strasbourg Univ. (France).
EXPERIMENTAL STUDY OF THE TREATMENT OF RADIATION INJURIES BY PADUTIN (KALLIKREINE) Annual Activity Report, 10 Jan. 1964–4 Jan. 1965 [ETUDE EXPERIMENTALE DU TRAITEMENT DES RADIOLESIONS PAR LA PADUTINE-DEPOT (KALLICREINE)
P. Mandel, J. M. Mantz, M. Delemen, C. Gary, P. Michaelidis et al Brussels, EURATOM, Jul. 1966 25 p In FRENCH, ENGLISH summary
(Contract Euratom-054-63-10 BIOF)
(EUR-2477.f, Vol. II) CSFTI: HC $1.00/MF $0.50

Experimental results confirmed the favorable effect of padutin (kallikrein) in the treatment of experimental radionecrosis in rats and guinea pigs. Tests on the rat showed that padutin has an optimum effect, the optimum dose in the rat appears to be 5 BU. The possible restorative and protective effect of padutin after total body irradiation (800 r) compared with other therapeutic substances is discussed. Present results suggest that padutin exercises a favorable influence as a restorative on the survival of irradiated animals. However, quantitative determinations of bone-marrow nucleic acids and cytological investigations, conducted concurrently, have also shown that padutin has a restortive action, which is particularly noticeable on the seventh day after irradiation. As regards RNA, this action would appear to be more pronounced in that of padutin than in that of AET. Where DNA is concerned, protection is of the same order of magnitude for both the substances used. Experiments on the effect of padutin on cicatrization in the pig have been concerned mainly with the anesthesia process and determination of the optimum irradiation dose which produces stable X-ray dermatitis. L.W.

N66-39876# United Kingdom Atomic Energy Authority, Harwell (England). Radiological Protection Div.
PHYSIOLOGICALLY SAFE WORKING CONDITIONS FOR MEN WEARING PRESSURISED SUITS
R. P. Rowlands Jun. 1966 82 p refs
(AHSB/RP/-R-70)

Experiments investigating the basic principles of thermal stress in pressurized suits has been carried out and from the results three formulas have been derived. Two of these provide a means of predicting the level of thermal stress, which is quantified as an index, in given work situations, and the third predicts the rate of sweating. Other physiological responses, i.e., body temperature and heart rate, are obtained from consideration of the zones into which the values of the index of thermal stress are divided. Control charts are given for a variety of conditions whereby the appropriate rate of supply of breathing air can be chosen to maintain thermal conditions in the comfortable zone where the body temperature is unlikely to exceed 37.8°C (100°F) and the rate of sweating is about 400 g/h. Use of the control charts permits appreciable flexibility in the management of pressurized suit operations; factors such as the thermal environment of the pressurized suit facility, the type of suit, the work task, and the need for rest pauses, can be considered objectively. It is shown that while a breathing air supply rate of 3 ft^3/min. could be satisfactory at temperatures of 15°C, some 10 ft^3/min. of air could be required at 25°C. Author

N66-39884# Central Lab. for Radiological Protection, Warsaw (Poland).
NATURAL AND ARTIFICIAL (FROM NUCLEAR EXPLOSIONS) GAMMA BACKGROUND RADIATION IN POLAND: DOSES RECEIVED BY THE POPULATION
J. Pensko 1966 40 p refs
(CLOR-49/D) CFSTI: HC $2.00/MF $0.50

The results of the environmental dose rate measurements of more important gamma emitters, natural and fission products for 20 different places in Poland are presented and discussed. Mainly the spectrometric method has been used and some measurements were done by means of the high pressure ionization chamber. The fission products from nuclear explosions considerably changed the natural gamma-ray background in Poland especially in summer 1963. The photopeak of Mn-54, which corresponds to the energy of 0.840 MeV, was observed in the spectrograms obtained in 1964. Author

N66-39889*# TRW Systems, Redondo Beach, Calif.
APPLICATION OF IMMOBILIZED BIOLOGICAL AGENTS TO WASTE TREATMENT Final Report, 25 May 1965–26 Jul. 1966
[1966] 79 p refs
(Contract NAS2-2857)
(NASA-CR-73033; TRW-05027-6001-R000) CFSTI: HC $2.50/MF $0.75 CSCL 06K

This report describes the work performed during this contract period to determine the applicability of systems utilizing aerobic immobilized biological agents under aerobic conditions for the treatment of human waste in space capsules. Several fixed bacterial beds were designed and constructed for conducting experimental studies in the laboratory. Two large packed columns containing a microbial layer grown on the surfaces of a polypropylene growth support were operated continuously, first individually and then in series. After appropriate conditioning on domestic sewage, the columns were converted to a form capable of acting upon human waste-water mixtures. Operated in series, the columns reduced the chemical oxygen demand of feces by 80 to 85 percent in a single pass. Thus, this study has resulted in the successful operation of a microbiological fixed-bed system utilizing electrochemically generated oxygen. Author

N66-39893*# Systems Technology, Inc., Hawthorne, Calif.
A "CRITICAL" TRACKING TASK FOR MAN-MACHINE RESEARCH RELATED TO THE OPERATOR'S EFFECTIVE DELAY TIME. PART I: THEORY AND EXPERIMENTS WITH A FIRST-ORDER DIVERGENT CONTROLLED ELEMENT
H. R. Jex, J. D. Mc Donnell, and A. V. Phatak Washington, NASA, Nov. 1966 116 p refs
(Contract NAS2-2288)
(NASA-CR-616) CFSTI: HC $3.00/MF $0.75 CSCL 05H

A first-order divergence is used as the controlled element to obtain certain theoretical advantages. Based on recent human response research, a theoretical analysis of this man-machine system is performed, and an experimental program is described which enables describing function and critical task measures to be compared. A specific critical task mechanization and operating procedure is developed which yields consistent and reliable measurements of the critical levels of instability. An analysis of the describing function results shows that, when operating near criticality, the subject's behavior is adequately represented by recently developed human operator describing function models and adaptation laws. Further, the extrapolation of describing function data to the critical level of instability shows that the operator consistently loses control at small, but finite, mean stability margins. The just-controllable first-order divergence is shown to be related dominantly to the operator's effective time delay, and secondarily to the nominal variations of his average tracking characteristics and to mid-frequency phase lags due to long period kinesthetic adaptation effects. Author

N66-39895*# Little (Arthur D.), Inc., Cambridge, Mass.
THERMAL MANIKIN
Frank Gabron and John Mc Cullough Washington, NASA, Nov. 1966 43 p refs
(Contract NAS9-3554)
(NASA-CR-644) CFSTI: HC $2.00/MF $0.50 CSCL 06B

Fabrication and qualification tests of an anthropomorphic thermal manikin and temperature logging-power control system are reported. This equipment was designed to simulate regional heat losses at relatively low skin temperatures where sweating is not present. The thermal manikin is divided into 17 thermally isolated regions in order to permit the simulation of heat loss variations which exist over different body regions. Each region of the manikin is equipped with a platinum resistance thermometer and resistance heating elements which are used to simulate metabolic rates. The temperature logging-power control system comprises three basic elements, a system electronics console, a digital computer, and an IBM typewriter. S.P.

N66-39918*# Massachusetts Inst. of Tech., Cambridge.
DISCHARGE PATTERNS OF SINGLE FIBERS IN THE CAT'S AUDITORY NERVE
Nelson Yuan-Sheng Kiang, Takeshi, Eleanor C. Thomas, and Louis F. Clark 1965 154 p refs *Its* Res. Monograph No. 35
(Grant NsG-496; NIH NB-01344; NSF GP-2495; NIH G-MH-0473-05; Contract DA-36-039-AMC-03200(E)
(NASA-CR-79115) CFSTI: HC $5.00/MF $1.00 CSCL 06C

Presented is a monograph which represents a systematic attempt to quantitatively describe the electrophysiological responses in the peripheral auditory nervous system. The purpose of this research was to discover how the mammalian auditory nerve describes sounds by examining the patterns of discharges in single fibers of the auditory nerve in response to controlled acoustic stimuli. The research was conducted on healthy adult cats, however it is surmised that results should have important bearing on the study of human hearing. Data are presented on methods and surgical procedures, spatial organization of the auditory nerve, response patterns to standard clicks, response patterns in relation to changes in click level, polarity, duration, and rate; response patterns to noise and tonal stimuli, tuning curves, spontaneous activity, and responses to combinations of simple acoustic stimuli. Results are presented within a framework that indicates the purpose and significance of each series of experiments. S.C.W.

N66-39919# Minnesota Univ., Minneapolis. School of Public Health.
THE BACTERIOLOGY OF "CLEAN ROOMS" Final Report
O. R. Ruschmeyer and D. Vesley Jul. 1966 89 p refs
(Grant NSG-643)
(NASA-CR-79114) CFSTI: HC $3.00/MF $0.75 CSCL 06M

Research focusing on the development of comprehensive standards for the sterilization of space hardware to assure that no man-made object impacting on a potential biological preserve in space will introduce biota of earthly origin, is reported. Presented are results of comparative studies of microbial levels in the environments of four industrial clean rooms which were made to determine the difference in contamination levels related to the specific controls in each room; an evaluation of specific factors thought to be important in minimizing the level of contaminants on space hardware; and preliminary comparative data on microbial contamination levels in a laminar flow room and conventional clean rooms. Some of the significant conclusions are summarized as follows: (1) Microbial evaluations of conventional clean rooms revealed contamination levels about one order of magnitude below minimum levels in critical areas of hospitals; (2) Predictably, the contaminants were approximately 75% species associated with shedding from human sources and no more than 10% appeared to be spore forming varieties; and (3) The laminar down flow room can achieve a further reduction in contamination levels of several orders of magnitude below the best conventional clean rooms. S.C.W.

N66-39925# Federal Aviation Agency, Oklahoma City, Okla. Office of Aviation Medicine.

PROBLEMS IN AVIATION PERSONNEL: INFLUENCE OF A TRANQUILIZER ON TEMPERATURE REGULATION IN MAN

P. F. Iampietro, V. Fiorica, J. R. Dille, E. A. Higgins, G. Funkhouser et al May 1966 10 p refs
(AM-66-14)

The effects of a tranquillizing drug of the propaediol group, meprobamate, on thermal balance of men exposed to a cold (50°F, 10°C), hot (110°F, 43.3C), or neutral (80°F, 26.7°C) environment have been investigated. Results show that a single dose of meprobamate (800 mg) has no effect on temperature regulation of men resting in a neutral environment. During exposure to hot or cold environments, however, the drug groups showed impairment in thermal balance. In the cold, heat production and core temperature of the drug group were lower than the placebo group. In the heat, only moderate elevations in the core temperatures of the drug group were detected. Possible physiological mechanisms responsible for these differences are discussed.
Author

IAA ENTRIES

A66-41042
NEW EQUIPMENT FOR PSYCHOMOTOR STUDIES [NEUE GERÄT ZUR UNTERSUCHUNG DER PSYCHOMOTORIK].
R. Seifert (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany).
Diagnostica, vol. 12, no. 1, 1966, p. 4-16. 8 refs. In German.

Discussion of three installations newly developed by the Space Medicine Department of the DVL for psychomotor tests. The first, termed "Two-hand Device," requires the operation of two crank handles in such a way that a contact pin does not depart from a target point. The second, termed "Rudder Control Test," requires that foot control be applied in such a way that the test seat is kept from rolling and faces the light bulb that happens to light up. The third, termed "Reaction Sensing Device," requires that the principle test consisting of multiple operation be reached in three successive subphases of prescribed duration. V.P.

A66-41043
RESPIRATORY ACTIVITY OF AVIAN BLOOD CELLS.
Emerson L. Besch (California, University, Dept. of Animal Physiology, Davis, Calif.).
Journal of Cellular Physiology, vol. 67, Apr. 1966, p. 301-306. 14 refs.
NASA Contract No. R-53; Contract No. NR-102-448.

The respiratory activity of avian blood cells was determined with samples of whole blood from individual male and female chickens. This oxygen consumption represents only that of the cells, since no measurable activity was found in the plasma samples. The precision of determining respiratory activity was examined statistically and found to be approximately that obtained with a blood-cell count but much less precise than the packed cell volume determination. The variability of cell count and mean corpuscular volume indicates that neither is a good means for expressing oxygen consumption - the most meaningful basis is oxygen consumption per milliliter of cells. The relationship between blood cell respiration and temperature is described. (Author)

A66-41044
INTERLINGUAL FACILITATION OF SHORT-TERM MEMORY.
Paul A. Kolers (Massachusetts Institute of Technology, Research Laboratory of Electronics, Cambridge, Mass.).
Journal of Verbal Learning and Verbal Behavior, vol. 5, June 1966, p. 314-319. 9 refs.
National Institutes of Health Grant No. MH-04737-04; NSF Grant No. GP-2495; Contract No. DA-36-039-AMC-03200(E); Grant No. NsG-496.

The probability of recalling a word from a long list of unconnected words increases monotonically with its frequency of occurrence. This facilitating effect of repetition on recall is found to occur interlingually. The probability of recalling a word when it and its translation are presented n/2 times in each of a bilingual's two languages is approximately equal to its unilingual presentation n times. Since the words in the two languages are usually phonetically and visually distinct, it appears to be their conceptual identity that permits the facilitation. (Author)

A66-41045
ON THE PROPAGATION OF THE NERVOUS IMPULSE DOWN MEDULLATED AND UNMEDULLATED FIBERS.
William F. Pickard (Massachusetts Institute of Technology, Dept. of Biology and Research Laboratory of Electronics, Cambridge, Mass.).
Journal of Theoretical Biology, vol. 11, 1966, p. 30-45. 15 refs.
Research supported by the Bell Telephone Laboratories; National Institutes of Health Grant No. MH-04737-05; NSF Grant No. GP-2495; Contracts No. DA-36-039-AMC-03200(E); No. AF 33(615)-1747; Grant No. NsG-496.

The medullated fiber is represented by a distributed active circuit and an expression involving the several ionic conductances is obtained for the voltage variation at a node; an heuristic argument is offered to show that this voltage cannot in general be described by an ordinary, linear, second-order differential equation even if the ionic conductances are specifically known as functions of time. It is also shown that the conduction velocity of a class of unmyelinated fibers can be approximated by a simple algebraic function of the fibers' parameters. (Author)

A66-41149
COMPUTER RAY TRACING OF THE OPTICAL SYSTEM OF THE SCHEMATIC EYE.
Robert S. Ledley, George C. Cheng (National Biomedical Research Foundation, Silver Spring, Md.), and William M. Ludlam (New York, Optometric Center, New York, N.Y.).
Nature, vol. 211, Aug. 27, 1966, p. 930-932. 10 refs.

Description of the results obtained in an investigation of the optical system of the human eye by the method of ray tracing by means of electronic digital computers. In particular, the effects on image formation of variations in pupil size, refractive indices, and curvatures of the cornea and lens are presented, using schematic-eye values based on Gullstrand's model. It is concluded that the computer ray-tracing method presents a powerful new tool for investigating in detail the many effects that must be taken into account if a thorough understanding is to be obtained of the image-forming capabilities of the eye. M.M.

A66-41204
THE NUTRITION OF THE AVIATOR AND THE COSMONAUT [LA NUTRITION DE L'AVIATEUR ET DU COSMONAUTE].
Fabre and Pingannaud (Armée de l'Air, Services de Santé, Paris, France).
Forces Aériennes Françaises, vol. 20, Aug.-Sept. 1966, p. 163-185. In French.

Analysis which defines the numerous analogies between the nourishment of aircrew and cosmonauts. The evolution of food supply concepts for aircrew, physiological factors involved, and experimental studies on men and animals are discussed. These studies indicate, for aircrew, a danger in haphazard and repeated ingestion of glucides because it may lead to hypoglycemia. New problems occur for the case of aircrew in high performance aircraft. Special types of food may be required in liquid or semiliquid form. For cosmonauts, the problem is complicated by weightlessness, which can affect swallowing and digestion. Suitable foodstuffs (dehydrated or solid, liquid or semiliquid) are discussed. F.R.L.

A66-41307
GIBBERELLIN PRODUCTION - GENETIC CONTROL IN THE FUNGUS GIBBERELLA FUJIKUROI.
Calvin Spector and Bernard O. Phinney (California, University, Dept. of Botany and Plant Biochemistry, Los Angeles, Calif.).
Science, vol. 153, Sept. 16, 1966, p. 1397, 1398. 8 refs.
NSF Grant No. GB-3314; Grant No. NsG-237-62.

Outline of the use of the fungus Gibberella fujikuroi in genetic studies of the production of gibberellins, a class of naturally occurring compounds that regulate a variety of growth and developmental processes in plants. A gene is identified which controls a step in the biosynthetic pathway of gibberellin production. This step is thought to be early in the pathway because it affects the accumulation of all the gibberellins produced by the fungus. B.B.

A66-41334
EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].

A66-41335

Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966. 272 p. In Russian.

CONTENTS:

A66-41335 #

SOME ASPECTS OF THE EFFECT OF SPACE-FLIGHT FACTORS ON THE CENTRAL NERVOUS SYSTEM [NEKOTORYE VOPROSY DEISTVIIA FAKTOROV KOSMICHESKOGO POLETA NA TSENTRAL'NUIU NERVNUIU SISTEMU].
N. N. Livshits.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 3-10. In Russian.

Brief review of a symposium dealing with possible peculiarities in the effects of ionizing radiation on the crew of a space vehicle. Such peculiarities include different realization rates of the radiation dose, changes in the radiation spectrum, and combined effect of radiative and dynamic factors. All these have an appreciable influence on the functioning of the central nervous system. Moreover, the dynamic factors produce marked changes on the metabolism.

V. P.

A66-41336 #

EFFECT OF RADIAL ACCELERATIONS ON THE BRAIN TEMPERATURE OF ANIMALS [DEISTVIE RADIAL'NYKH USKORENII NA TEMPERATURU GOLOVNOGO MOZGA ZHIVOTNYKH].
V. Ia. Klimovitskii.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 11-24. In Russian.

Investigation of the thermal reaction of the brain of a dog and six rabbits to 10-g accelerations on a centrifuge, repeated daily for the duration of 30 sec with intervals of 30 min. It is found that the thermal reaction of the brain of both dog and rabbit is characterized by two distinct phases; the first is associated with the mechanical effect, while the second develops after completion of this effect.

The first phase of the thermal reaction to longitudinal accelerations (in direction from head to tail) after numerous consecutive exposures exhibits changes similar to those of cerebral blood flow in these conditions and is their physiological and mechanical consequence. The first phase of the thermal reaction to transverse acceleration (from chest to back) differs from the corresponding reaction in longitudinal acceleration in that it is more stable and less dependent on the number of exposures. V.P.

A66-41337 #
FUNCTIONAL STATE OF THE OTOLITIC PART OF THE VESTIBULAR APPARATUS OF GUINEA PIGS AFTER TWOFOLD CENTRIFUGING [O FUNKTSIONAL'NOM SOSTOIANII OTOLITOVOI CHASTI VESTIBULIARNOGO ANALIZATORA MORSKIKH SVINOK POSLE DVUKRATNOGO TSENTRIFUGIROVANIIA].
Z. I. Apanasenko.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 25-44. In Russian.

Investigation of the effect of 8-g centrifuging applied transversely (chest-back) to guinea pigs for 15 min twice in the course of 24 hr on the functional state of the otolitic part of their vestibular apparatus. The centrifuging is found to produce a strong but relatively short (2-day) increase in bioelectric activity of the musculus extensor group in the hind legs. These changes last less time and are less pronounced than those resulting from exposure to vibration with similar parameters. A mechanism for the effects observed is proposed. The state of the animals exhibits no deviation from the normal. An analysis of peripheric blood shows insignificant leukocytosis. A comparison of the isolated effect of dynamic factors with the effects of space flight reveals a better correlation between the trends and duration of the effects of space flight and vibration than those of space flight and centrifuging. Effects of space flight are seen to reveal in some cases the features of vibration plus centrifuging, but neither vibration nor centrifuging can reproduce completely the effects of space flight. V.P.

A66-41338 #
EFFECT OF REPEATED VIBRATION ON THE FUNCTIONAL STATE OF THE SPINAL REFLEX ARC [VLIIANIE MNOGOKRATNOI VIBRATSII NA FUNKTSIONAL'NOE SOSTOIANIE DUGI SPINNOMOZGOVOGO REFLEKSA].
M. A. Kuznetsova.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 45-67. In Russian.

Investigation of the effects of vertical (head-tail) vibrations at a frequency of 70 cps and an amplitude of 4 mm, applied for 15 min twice a day for five days at intervals of lying 2 or 3 days, on the functional state of the spinal reflex arc of guinea pigs. The vibration is found to cause long-lasting (34 days) changes in the functional state of the reflex arc of the defense reaction. Inverse correlation was discovered between the changes in latency period and the changes in the strength of the threshold electric stimulus. The earlier part of the tests revealed a cumulation of vibration effects, while in the later part a tendency toward improvement of the reflex activity was observed. It is found that a series of parabiotic changes takes place in the reflex arc, indicating a transfer from a higher to a lower state of inhibition. This adaptation process, however, was difficult and incomplete. V.P.

A66-41339 #
EFFECT OF VERTICAL VIBRATION AND NOISE ON THE CONDITIONED REFLEXES OF RATS [VLIIANIE VERTIKAL'NOI VIBRATSII I SHUMA NA USLOVNYE REFLEKSY KRYS].
N. N. Livshits and E. S. Meizerov.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 68-80. In Russian.

Study of the motor food reflexes of rats after exposure to vertical vibration and noise. The test rats were exposed to vertical vibrations of 70 cps, amplitude 0.4 mm, for 15 min, then exposed to the same effects again after 14 days and for a third time after a further interval of 7 days. Controls were placed near the engaged vibrostand during exposure of the experimental rats. In rats with a high initial level of conditioned reflexes vibrations caused inhibition and disturbed conformity between the level of conditioned reflexes and the stimulating strength. Significant variations in response were noted in different individuals. In rats with a low initial level of conditioned reflexes vibration caused an increase in conditioned reflexes and deinhibition of differentiation and phase phenomena. Control animals exposed only to vibrostand noise showed significantly less highly expressed changes than the experimental animals. W.A.E.

A66-41340 #
PROBLEM OF THE FUNCTIONAL SIGNIFICANCE OF THE CHANGE IN BIOELECTRIC ACTIVITY OF THE BRAIN AND ITS OXIDATION ABILITY DURING VIBRATION [K VOPROSU O FUNKTSIONAL'NOI ZNACHIMOSTI IZMENENII BIOELEKTRICHESKOI AKTIVNOSTI MOZGA I EGO OKISLITEL'NOI SPOSOBNOSTI VO VREMIA VIBRATSII].
L. D. Luk'ianova and E. P. Kazanskaia.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 81-94. In Russian.

Analysis of the effects of vibration on the bioelectric activity of the brain and its oxygen consumption, using rats as experimental animals. During exposure to vertical vibration at 70 cps, amplitude 0.4 mm, for 15 min, a stable excitation focus appears in the higher regions of the central nervous system, accompanied by an increase in oxygen consumption and hypersynchronized low-frequency oscillations on the electroencephalogram. A phase of generalized excitation and subsequent concentration of the excitation process in the sensomotor and visual regions of the cortex were observed. It was demonstrated that compensatory-adaptive mechanisms contributing to a decrease in vibration sensitivity are at the expense of the decreasing excitation processes. W.A.E.

A66-41341 #
EFFECT OF VIBRATIONAL STIMULUS ON THE OXIDATION METABOLISM OF THE BRAIN IN ANIMALS WITH PARTIAL DESTRUCTION OF THE AUDITORY AND VESTIBULAR APPARATUS [VLIIANIE VIBRATSIONNOGO RAZDRAZHENIIA NA OKISLITEL'NYI METABOLIZM GOLOVNOGO MOZGA U ZHIVOTNYKH S CHASTICHNYM VYKLIUCHENIEM SLUKHOVOGO I VESTIBULIARNOGO APPARATOV].
L. D. Luk'ianova and S. M. Ambrosova.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 95-104. In Russian.

Study of the effects of vibration of the oxygen metabolism of the brain in rats that have had partial excision of the auditory and vestibular apparatus and in anesthetized control rats. Oxygen consumption in different parts of the brain of rats exposed to 15 min of vibration at 70 cps, amplitude 0.4 mm, was analyzed. It was found that partial destruction of the vestibular apparatus contributes to the appearance of compensatory-adaptive adjustments without a decrease in the general functional level of the central nervous system. Control experiments on rats anesthetized with ether or chloroform gave direct proof of the great importance of the vestibular apparatus in perception of vibrational stimuli. W.A.E.

A66-41342 #
INVESTIGATION OF THE CONJUNCTION OF OXIDATION-METABOLISM PROCESSES OF THE BRAIN, ITS ELECTRIC ACTIVITY, AND CONDITIONED-REFLEX ACTIVITY OF ANIMALS AFTER VIBRATION [ISSLEDOVANIE SOPRIAZHENNOSTI PROTSESSOV OKISLITEL'NOGO METABOLIZMA GOLOVNOGO MOZGA, EGO ELEKTRICHESKOI AKTIVNOSTI I USLOVNOREFLEKTORNOI DEIATEL'NOSTI ZHIVOTNYKH POSLE VIBRATSII].
L. D. Luk'ianova, A. V. Kol'tsova, E. S. Meizerov, and E. P. Kazanskaia.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 105-124. In Russian

Consideration of the effect of vibration on the combined processes of oxidation and electric activity of the brain and conditioned reflexes in rats. The animals were exposed to 15 min of vertical vibration at 70 cps, amplitude 0.4 mm, six times a week for five weeks. The oxygen consumption of the brain tissues, total bioelectric activity, infraslow oscillations, and conditioned-reflex activity of the rats were analyzed. It was discovered that the changes in different indices of the functional state of the central nervous system had a phased nature. The first period (first to fourth vibrations) showed a generalized postvibration inhibition in the higher regions of the brain. In the second period (after the fourth vibration), compensatory-adaptive processes contributing to relative normalization of functions were developed. The third period (after the 20th to 25th vibration) was characterized by a total decrease of the functional activity of the higher regions in the central nervous system.
W.A.E.

A66-41343 #
CHANGE IN RESPIRATION DURING VIBRATION [IZMENENIE DYKHANIIA PRI VIBRATSII].
E. P. Kazanskaia and L. D. Luk'ianova.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 125-128. In Russian.

Analysis of the effects of vibration on external respiration in rats. The animals were subjected to vertical vibration for 15 min at 70 cps, amplitude 0.4 mm, and their respiration rates during exposure were measured by special pickups attached to their chests. During the first half of exposure to vibration a general increase in the rate of respiration was noted, but in the second half and the postvibrational period the response varied in individuals. Changes in oxidation metabolism induced by vibration are therefore apparently not connected with changes in respiration. W.A.E.

A66-41344 #
EFFECT OF ACUTE EXPOSURE TO X RAYS ON VENOUS BLOOD FLOW IN RABBIT BRAIN VESSELS [DEISTVIE OSTROGO RENTGENOVSKOGO OBLUCHENIIA NA VENOZNYI KROVOTOK V SOSUDAKH GOLOVNOGO MOZGA KROLIKOV].
V. Ia. Klimovitskii.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 129-137. In Russian.

Consideration of the effects caused by X rays on blood flow in veins and sinuses in the brain of the rabbit. One group of experimental rabbits was exposed to a local dose of 2000 r on the back and abdomen and another group was exposed to total irradiation, with a dose of 1000 r. Cerebral venous blood flow was measured by thermistors, coupled with heaters, in the veins and sinuses in the brain surfaces of irradiated rabbits. In both groups a decrease of cerebral blood flow was observed in the first hours after irradiation. Locally irradiated animals were observed for 6 to 8 hours, and totally irradiated animals until they died of radiation sickness. In the latter group, a second drop in cerebral blood flow was observed 1 or 2 days before death. Although no definite conclusions could be reached on the effect of radiation on cerebral hemodynamics, the changes observed cannot be considered as being exclusively the result of cardiovascular disorders. They may be at least partly a secondary decrease in the level of blood circulation of the brain in accordance with its current needs. W.A.E.

A66-41345 #
FEATURES OF THE EFFECTS OF DIFFERENT TYPES OF RADIATION ON THE HIGHER NERVOUS ACTIVITY OF SMALL ANIMALS. I - COMPARATIVE EFFECT OF FAST NEUTRONS, PROTONS, AND GAMMA-RADIATION WITH A DOSE OF 300 RAD [OSOBENNOSTI DEISTVIIA RAZNYKH VIDOV IZLUCHENIIA NA VYSSHUIU NERVNUIU DEIATEL'NOST' MELKIKH ZHIVOTNYKH. I - SRAVNITEL'NOE DEISTVIE BYSTRYKH NEITRONOV, PROTONOV I GAMMA-IZLUCHENII V DOZE 300 RAD].
A. P. Korolevskii.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 138-153. In Russian.

Study of the comparative effect of fast neutrons, protons of 510 Mev, and gamma-radiation (all with a dose of 300 rad) on the higher nervous activity of mice. The conditioned-reflex motor drinking response was the criterion studied. Exposure to all the types of radiation listed induced disturbances in both excitation and inhibitory nervous processes. Exposure to neutrons and gamma-rays caused greater damage to the excitation process, while proton irradiation had a greater effect on the inhibitory process. Neutron radiation was more efficient than gamma-radiation, and the latter was more efficient than proton irradiation. A parallel was noted *between the dependence of disturbances in conditioned-reflex activity* on linear energy transfer and the change in the indices of the peripheral blood picture. W.A.E.

A66-41346 #
FEATURES OF THE EFFECTS OF DIFFERENT TYPES OF RADIATION ON THE HIGHER NERVOUS ACTIVITY OF SMALL ANIMALS. II - COMPARATIVE EFFECT OF FAST NEUTRONS AND GAMMA-RADIATION WITH A DOSE OF 25 RAD [OSOBENNOSTI DEISTVIIA *RAZNYKH VIDOV IZLUCHENIIA NA VYSSHUIU NERVNUIU DE*-IATEL'NOST' MELKIKH ZHIVOTNYKH. II - SRAVNITEL'NOE DEISTVIE BYSTRYKH NEITRONOV, I GAMMA-IZLUCHENII V DOZE 25 RAD].
A. P. Korolevskii.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 154-164. In Russian.

Comparison of the effect of fast neutrons and gamma-radiation in a dose of 25 rad on the higher nervous activity of mice. The conditioned-reflex drinking method was used in the experiments. Both types of radiation weakened both the inhibitory and excitation nervous processes. Neutron radiation had a more marked effect than gamma-radiation. A parallel was noted between the disturbances of conditioned-reflex activity as a function of linear energy transfer of irradiation and changes noted in hematological indices. W.A.E.

A66-41347
FEATURES OF THE EFFECT OF DIFFERENT TYPES OF RADIATION ON THE HIGHER NERVOUS ACTIVITY OF SMALL ANIMALS. III - COMPARATIVE EFFECT OF FAST NEUTRONS, PROTONS, AND GAMMA-RADIATION WITH A DOSE OF 150 RAD [OSOBENNOSTI DEISTVIIA RAZNYKH VIDOV IZLUCHENIIA NA VYSSHUIU NERVNUIU DEIATEL'NOST' MELKIKH ZHIVOTNYKH. III - SRAVNITEL'NOE DEISTVIE BYSTRYKH NEITRONOV, PROTONOV I GAMMA-IZLUCHENII V DOZE 150 RAD].

A. P. Korolevskii.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 165-179. In Russian.

Study of the effect of fast neutrons, protons with an energy of 510 Mev, and gamma-radiation, all with a dose of 150 rad, on the higher nervous activity of rats of the "August" line. Motor drinking conditioned reflexes of the animals were studied. Disturbances of excitation and inhibitory processes were caused in all animals irradiated. The excitation process was most affected by neutron and gamma-radiation, while proton radiation had the greatest effect on the inhibitory process. Neutron radiation was the most effective of the three types studied, and proton radiation was the least effective. W.A.E.

A66-41348 #
COMPARISON OF THE EFFECT OF TOTAL CHRONIC AND ACUTE GAMMA-RADIATION ON THE HIGHER NERVOUS ACTIVITY OF WHITE RATS - THE PROBLEM OF THE TIME FACTOR [SRAVNENIE DEISTVIIA OBSHCHIKH KHRONICHESKIKH I OSTRYKH GAMMA-OBLUCHENII NA VYSSHUIU NERVNUIU DEIATEL'NOST' BELYKH KRYS - K VOPROSU O ROLI FAKTORA VREMENI].
E. S. Meizerov.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 180-196. In Russian.

Study of the conditioned motor food reflexes and cell content of the peripheral blood of white rats of the Wister line after chronic and acute gamma-radiation. One group was exposed to a dose rate of 85 r/min and the other group to 6 r per day; both groups received a total dose of 160 r. Both chronic and acute irradiation caused similar changes in the disturbances of higher nervous activity, and the disturbances were somewhat more severe in rats exposed to chronic irradiation. However, the decrease in the leucocyte, erythrocyte, and hemoglobin contents of the peripheral blood was more sharply expressed in rats exposed to acute irradiation. W.A.E.

A66-41349 #
EFFECT OF PROLONGED GAMMA-RADIATION ON THE FUNCTIONING OF THE VESTIBULAR ANALYZER AND THE ROLE OF THE TIME FACTOR IN THE REACTIONS OF THE NERVOUS SYSTEM TO RADIATION [DEISTVIE PROLONGIROVANNOGO GAMMA-OBLUCHENIIA NA FUNKTSII VESTIBULIARNOGO ANALIZATORA I ROL' FAKTORA VREMENI V LUCHEVYKH REAKTSIIAKH NERVNOI SISTEMY].
Z. I. Apanasenko.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 197-217. In Russian.

Consideration of the effects of prolonged gamma-radiation on the vestibular analyzer of the hind-leg muscles of guinea pigs. The animals were exposed to prolonged gamma-radiation at the rate of 0.6 r/min for a total dose of 500 r. The bioelectrical activity of hind-leg extensors was investigated before, during, and after stimulation of the vestibular analyzer. All the animals survived, and their weight changes and general clinical condition were studied. Prolonged irradiation produced strong and long-term changes in the electromiographic characteristics of the vestibular reflex of the hind-leg muscles. These changes were greater than those produced by the same dose under acute irradiation and differed from them qualitatively. The severity of radiation sickness was lower, and changes in peripheral blood were smaller than after acute exposure. W.A.E.

A66-41350 #
COMPLEX EFFECT OF TWOFOLD VIBRATION AND PROLONGED IRRADIATION ON THE FUNCTIONAL STATE OF THE VESTIBULAR ANALYZER [KOMPLEKSNOE DEISTVIE DVUKRATNOI VIBRATSII I PROLONGIROVANNOGO OBLUCHENIIA NA FUNKTSIONAL'NOE SOSTOIANIE VESTIBULIARNOGO APPARATA].
Z. I. Apanasenko.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 218-235. In Russian.

Consideration of the combined effects of twofold vibration and prolonged exposure to gamma-radiation on the higher nervous activity of guinea pigs. The animals were exposed to 15 min of vibration before and after exposure to 500 r of gamma-radiation at a rate of 0.6 r/min. The bioelectric activity of hind-leg extensors before, during, and after stimulation of the vestibular analyzer was studied, and the survival rate, amount of leucocytes in the peripheral blood, weight changes, and general clinical state of the animals were explored. Exposure to vibration changes the radiation effects on the electromiographic characteristics of the vestibular reflexes, most significantly in the first days after exposure. However, the effects of prolonged irradiation are less influenced by vibration than analogous effects of acute irradiation. The cell count of the peripheral blood, weight dynamics, general clinical state, and survival rate of animals under combined exposure do not differ significantly from the corresponding parameters after one prolonged exposure to radiation. W.A.E.

A66-41351 #
COMPLEX EFFECT OF VIBRATION AND IONIZING RADIATION ON THE CONDITIONED REFLEXES OF RATS [KOMPLEKSNOE DEISTVIE VIBRATSII I IONIZIRUIUSHCHIKH IZLUCHENII NA USLOVNYE REFLEKSY KRYS].
N. N. Livshits and E. S. Meizerov.
IN: EFFECT OF SPACE-FLIGHT FACTORS ON THE FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY].
Edited by N. N. Livshits.
Moscow, Izdatel'stvo Nauka, 1966, p. 236-251. In Russian.

Study of the conditioned motor food reflexes of rats after exposure to various combinations of vibration, vibrostand noise, and X rays. One group of animals was subjected to 15 min of vertical vibration at 70 cps, amplitude 0.4 mm, and immediately afterward to 50 r of X radiation; a second group was exposed to vibrostand noise for 15 min and immediately afterward to the same dose of X radiation as the first group; and a third group to 15 min of vibrostand noise only, as a control. All exposures were repeated three times, the interval between the first and second exposures being 14 days and the one between the second and third exposures seven days. In the first week after the first combined exposure, the vibration effect dominated in all indices, while in the second week a combination of both factors was observed. After the second and third combined exposures the effects of irradiation and vibration were entirely summated. W.A.E.

A66-41377
SYNTHESIS OF FATTY ACIDS BY YEAST PARTICLES.
Harold P. Klein (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).
Journal of Bacteriology, vol. 92, July 1966, p. 130-135. 11 refs.

Synthesis of fatty acids by yeast particles. When a mitochondria-free homogenate of Saccharomyces cerevisiae was centrifuged at 100,000 x g for 60 min, the sedimented crude particles incorporated acetate into fatty acids but not into nonsaponifiable lipids. Degradation of the fatty acids formed indicated this to be de-novo synthesis rather than chain elongation. Subfractions of the crude particles were obtained. The "ribosomal" fraction was unable to synthesize fatty acids but had properties indicating the presence of acetokinase, fatty acid desaturase, and, probably, acetyl-coenzyme A carboxylase. A "light" particle fraction with a high specific activity of fatty acid synthetase was also obtained. Fatty acid synthesis by the "soluble"

supernatant fluid appeared to be the result of contamination by the "light" particles. The data suggested the presence of several particulate entities in mitochondria-free homogenates. (Author)

A66-41549
VISUALLY EVOKED RESPONSE CORRELATES OF PERCEPTUAL MASKING AND ENHANCEMENTS.
E. Donchin and D. B. Lindsley (California, University, Depts. of Psychology and Physiology, and Brain Research Institute, Los Angeles, Calif.).
Electroencephalography and Clinical Neurophysiology, vol. 19, 1965, p. 325-335. 33 refs.
NSF Grant No. GB-1844; Grant No. NsG-623; Contract No. Nonr-233(32).

Electroencephalographic investigation of average cortical potentials to pairs of flash stimuli as studied in five subjects under conditions which give rise to three perceptual effects. The computer averaging technique is used to study the recorded evoked potentials elicited by paired flashes. When the flashes are relatively far apart (more than about 160 msec) two distinct flashes are seen and there is no perceptual interaction. As the flashes are brought closer together there is a retroactive brightness enhancement of the first flash by the second. When the flashes are brought still closer together a stage is reached where only one flash is seen, and the characteristics of the first flash which the subject is required to report are masked. The parameters of the flash stimuli determine the critical point at which twoness and brightness enhancement cease and where masking of the first flash by the second begins. The parameters are the luminance level, the ratio of the luminances of the two flashes, and their durations. M.L.

A66-41550
AVERAGE EVOKED POTENTIALS AND REACTION TIMES TO VISUAL STIMULI.
E. Donchin and D. B. Lindsley (California, University, Depts. of Psychology and Physiology, and Brain Research Institute, Los Angeles, Calif.).
Electroencephalography and Clinical Neurophysiology, vol. 20, 1966, p. 217-223. 22 refs.
NSF Grant No. GB-1844; Grant No. NsG-623.

Experimental investigation of the average evoked potentials to brief light flashes as recorded from occipital, vertex, temporal, and orbital leads in 10 subjects during a reaction time (RT) study. The use of computer averaging techniques makes possible the isolation of event-specific activity (evoked potentials) from other ongoing activity. Subjects performed both with an without knowledge of results. The amplitude of the average evoked potentials was related to RT. For a given sequence of RTs, faster reactions were associated with larger amplitude average evoked potentials. Knowledge of results shortened RTs and increased the magnitude of average evoked potentials. The diffuse and nonspecific character of the main component of the average evoked potential appears to reflect changes in cortical excitability associated with the variability of RT, which is interpreted in relation to the nonspecific arousal and alerting mechanism. M. L.

A66-41574
NONLINEAR AND TIME-VARYING DYNAMICAL MODELS OF HUMAN OPERATORS IN MANUAL CONTROL SYSTEMS.
Walter W. Wierwille and Gilbert A. Gagné (Cornell Aeronautical Laboratory, Inc., Avionics Dept., Buffalo, N.Y.).
Human Factors, vol. 8, Apr. 1966, p. 97-120. 5 refs.
Contract No. NAS 1-4920.

Application of a deterministic theory for characterizing or modeling the dynamics of a human operator in a manual control system. Linear time-varying, nonlinear time-varying, and nonlinear constant-coefficient models are obtained by applying the theory to tracking data taken for one- and two-axis tasks with various displays. The accuracy and fidelity of these advanced models are explored in detail. New information about time-variability and nonlinearity of the human operator, obtained by studying the models and the manual control system signals, is included. (Author)

A66-41575
DESIGN OF CONTROLS USING FORCE AS A CRITERION.
Stephan A. Konz and Robert A. Day (Kansas State University of Agriculture and Applied Science, Dept. of Industrial Engineering, Manhattan, Kan.).
Human Factors, vol. 8, Apr. 1966, p. 121-127. 20 refs.

Study, using a force platform, of the effect of varying the height and handle orientation of a push-pull task. Each of the 10 subjects performed the task at knee, hip, waist, chest, and eye heights, and at each of the heights the handle was oriented in five different positions. Even though the force required for the task itself did not vary, changing the height of the handle forced each subject to exert a force to maintain his own body position. This force exerted by the subject was minimized when the handle was at chest height. The only previous studies on optimum work heights have concerned work surface location. Since their usual recommendations are to place a work surface below rather than above the elbow, it seems additional experimentation is desirable. (Author)

A66-41576
INTERSENSORY COMPARISONS OF REACTION TIME USING AN ELECTRO-PULSE TACTILE STIMULUS.
Jay R. Swink (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.).
Human Factors, vol. 8, Apr. 1966, p. 143-145. 7 refs.

The literature on cutaneous communication suggests that a square-wave electropulse may be a more effective tactile stimulus for cross modality comparisons of reaction times than more traditional stimuli. It was hypothesized that the electropulse would give faster reaction times than either light or sound when presented independently or in simultaneous combinations with the other stimuli. Mean reaction times of 10 male subjects, analysis of variance, and mean separation test all indicated that the electopulse resulted in faster reaction times and less variability of responses than the other stimuli in both single and combined presentations. The hypotheses were supported and an ordering of reaction times was statistically established as following from the hypotheses. Pooling of stimuli effectiveness was offered as an explanation for the rapid reaction times of combined stimuli. (Author)

A66-41577
DISTORTION, FILL AND NOISE EFFECTS ON PATTERN DISCRIMINATION.
Raymond B. Webster (Bunker-Ramo Corp., Manual Control Systems Dept., Canoga Park, Calif.).
Human Factors, vol. 8, Apr. 1966, p. 147-155. 23 refs.
U.S. Public Health Service Grant No. MHO 7938-01.

Study of the effects of distortion, fill, and noise effects on pattern discrimination. Patterns were generated from a 10-by-10 matrix on a random basis and were comprised of black filled squares. There were four levels of pattern fill or complexity. Distortion was the random displacement of basic pattern elements while noise was the filling in of additional selected random pattern elements. One hundred and forty-four male and female undergraduates served as the subjects. Patterns were projected automatically with a stimulus presentation time of 3.0 sec and a constant intertrial interval of 5.0 sec. The method of constant stimuli was employed. The results indicated that the discrimination of patterns, as generated in this study, were significantly effected by fill, noise, and distortion at the 0.01 level. Interaction effects were significant also at the same level. Response times were also significantly affected as a function of fill and noise. (Author)

A66-41578
THE INSTRUCTIONAL SYSTEM APPROACH TO MAINTENANCE TECHNICAL TRAINING - DEVELOPMENT AND IMPLEMENTATION MODEL.
Charles L. Nunnelly (Douglas Aircraft Co., Inc., Long Beach, Calif.), Andrew G. Klemmer (Douglas Aircraft Co., Inc., Training School, Long Beach, Calif.), Robert E. Corrigan (Litton Industries, Inc., Instructional Materials Div., Anaheim, Calif.), and Roger A. Kaufman (Douglas Aircraft Co., Inc., Long Beach; Chapman College, Orange, Calif.).
Human Factors, vol. 8, Apr. 1966, p. 163-172.
Research sponsored by the Douglas Independent Research and Development Program.

Description of an Instructional System model for meeting maintenance technical training requirements for complying with USAF weapon system requirements. Methods are also presented for determining training requirements and identifying appropriate methods and media for meeting student terminal performance requirements. (Author)

A66-41579

INSTRUCTIONAL SYSTEM APPROACH TO FLIGHT CREW TRAINING.

Kenneth B. Wallis (Studebaker Corp., Cincinnati, Ohio), Warren L. Ewart (Douglas Aircraft Co., Inc., Long Beach, Calif.), and Roger A. Kaufman (Douglas Aircraft Co., Inc., Long Beach; Chapman College, Orange, Calif.).

Human Factors, vol. 8, Apr. 1966, p. 173-178.

Research sponsored by the Douglas Independent Research and Development Program.

Discussion of the rationale for analysis and definition of flight crew training requirements. Using the Instructional System Approach, the concept of flight crew performance from a management aspect is presented together with methods for determining detailed flight crew training requirements. A systematic approach to flight training is considered and a functional subsystem analysis is made. M.F.

A66-41619

THE HUMAN BODY IN EQUIPMENT DESIGN.

Albert Damon (Harvard University, Cambridge, Mass.), H. W. Stoudt, and R. A. McFarland (Harvard University, Harvard School of Public Health, Cambridge, Mass.).

Research supported by the U.S. Air Force, Harvard University, the U.S. Public Health Service, the American Heart Association, the U.S. Army, the U.S. Navy, the U.S. Veterans Administration, the General Motors Corp., the National Association of Motor Bus Operators, and the American Trucking Associations.
Cambridge, Mass., Harvard University Press, 1966. 360 p. $11.95.

A guide for the designer of equipment involving human body size and mechanical capabilities is also commended to physical anthropologists. Specific recommendations are presented for many biomechanical features of man-machine integration, together with data and methods applicable to the solution of other problems. Although the two aspects of applied physical anthropology (fitting men into spaces and fitting gear onto men) tend in fact to coincide in the design of closely fitting space envelopes like the full-pressure spacesuit, fitting personal equipment to the man is a distinct field of study. Anthropometry and human engineering, biomechanics and equipment design, human body composition, and tolerance to physical and mechanical forces are extensively examined. Design recommendations for hand and foot controls, the design of seats and the seated workspace, design recommendations for passageways, doorways, and escape hatches, and recommendations for lifting and carrying are given. Numerous tables and figures are presented. F.R.L.

A66-42313

MOLECULAR PARAMETERS IN MEMORY AND LEARNING.

Francis O. Schmitt.

IN: RECENT ADVANCES IN BIOLOGICAL PSYCHIATRY. VOLUME 8.
New York, Plenum Press, 1966, p. 225-233. 22 refs.
Research supported by the Massachusetts Institute of Technology, the Neurosciences Research Foundation, the Rogosin Foundation, the Trustees under the Wills of Charles A. and Marjorie King, and the Louis and Eugenie Marron Foundation; National Institutes of Health Grants No. NB-00024-15; No. GM-10211-03; Grant No. NsG-462; Contracts No. Nonr-1841(27); No. Nonr (G)-00089-64.

Study of the molecular parameters of memory and learning, and how innate and experiential information can be stored, transferred, and read out in macromolecules arrayed at critical regions in neurons and brain regions. Information processing in molecular genetics and molecular immunology is considered, and extensive attention is given to the status and promise of molecular neurology. F.R.L.

A66-42315

MORTALITY AND HISTOPATHOLOGY OF GERM-FREE RATS AND MICE EXPOSED TO 100% OXYGEN.

Ronald A. Wright, Edwin P. Hiatt, and Harold S. Weiss (Ohio State University, College of Medicine, Dept. of Physiology, Environmental Physiology Laboratory, Columbus, Ohio).

Society for Experimental Biology and Medicine, Proceedings, vol. 122, p. 446-448. 11 refs.
Grant No. NsG-295-62.

Delineation of the role of chronic infection in oxygen toxicity by studying the response of germ-free rats and mice to hyperoxia. Two germ-free experiments are described involving eight rats and 14 mice breathing 99 ± 1% oxygen at 1 atm (OAP). Germ-free rats and mice tend to die sooner and within a narrower time span than conventional animals on exposure to 100% O_2, suggesting that chronic respiratory conditions may increase resistance to O_2 toxicity. B.B.

A66-42316

PHOTOINHIBITION OF CHLOROPLAST REACTIONS. I - KINETICS AND ACTION SPECTRA.

L. W. Jones and B. Kok (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.).

Plant Physiology, vol. 41, June 1966, p. 1037-1043. 27 refs.
Contracts No. AF 41(609)-2369; No. NASw-747.

Experimental investigation of the kinetics and spectral characteristics of the photoinhibition of spinach chloroplast reactions over a range between 230 and 700 mμ. The decline of activity due to preillumination was independent of wavelength, and dependent on the number of quanta applied, not on the rate of application. The effectiveness spectra of photoinhibition indicate that active UV light is absorbed by a pigment which is not a normal light absorber for photosynthesis and acts with a high quantum efficiency for photoinhibition. M.M.

A66-42317

THERMAL RESPONSES OF MAN DURING REST AND EXERCISE IN A HELIUM OXYGEN ENVIRONMENT.

Edward L. Fox (Ohio State University, College of Medicine, Dept. of Preventive Medicine and Dept. of Physical Education, Exercise Physiology Research Laboratory, Columbus, Ohio), Harold S. Weiss, Edwin P. Hiatt (Ohio State University, College of Medicine, Dept. of Physiology, Environmental Physiology Laboratory, Columbus, Ohio), and Robert L. Bartels (Ohio State University, Dept. of Physical Education, Columbus, Ohio).

Archives of Environmental Health, vol. 13, July 1966, p. 23-28. 26 refs.
Grant No. NsG-295-62.

Measurements of mean skin temperature, rectal temperature, mean body temperature, sweat loss, and heart rate in man during rest, moderate exercise, and recovery, while exposed either to 79% He-21% O_2 or to air. At high temperature, irrespective of relative humidity (RH), responses in He-O_2 were similar to those in air. Rest, exercise, and recovery rectal and mean body temperatures and heart rates were the same in the two media, but sweat loss was 27% less in He-O_2. These differences are explained by the higher thermal conductivity of He relative to N_2 affecting conductive-convective heat loss in proportion to the skin-to-gas thermal gradient. Calculations indicate that for each 1°F increase in gradient, the mean skin temperature in He-O_2 will be approximately 0.1°F lower than in air. M.M.

A66-42318

REACTION TIME TO ELECTROCUTANEOUS ONSET AND OFFSET STIMULATION.

Thomas G. Sticht and Emerson Foulke (Louisville, University, Louisville, Ky.).

Psychonomic Science, vol. 4, no. 6, 1966, p. 213, 214. 6 refs.
Grant No. NGR-18-002-007.

Experimental investigation of reaction to electrocutaneous stimuli. The results indicated that onset was faster than offset reaction time (RT) at all three intensity levels used. The results confirm those of Woodrow in demonstrating that the RT to electrocutaneous stimulation is faster to the onset than to the cessation of stimulation. M.M.

A66-42347
INTELLIGENT LIFE IN THE UNIVERSE.
I. S. Shklovskii (Moskovskii Gosudarstvennyi Universitet, Astronomicheskii Institut; Akademiia Nauk SSSR, Moscow, USSR) and Carl Sagan (Harvard University; Smithsonian Institution, Smithsonian Astrophysical Observatory, Cambridge, Mass.).
(Translation of Vselennaia, Zhizn', Razum. Moscow, 1963).
San Francisco, Calif., Holden-Day, Inc., 1966. 509 p.
$8.95.

This book is a modern discussion of the entire panorama of natural evolution - including the origins of the universe, the evolution of stars and planets, the beginnings of life on earth, and the development of intelligence and technical civilizations among galactic communities. The fundamental properties of stars are reviewed, and the evolution of galaxies is studied. Multiple star systems are described, and historical views on the origin of the solar system are presented. The search for life on Mars is discussed, the expected environments and possible biology of Mercury and Venus are studied, and the solar system beyond Mars is considered. Other topics discussed include radio and optical contacts among galactic civilizations, the character of the signals of interstellar radio contact, and intelligent life as a factor on the cosmic scale. M.F.

A66-42366
OBSERVING BEHAVIOR DURING INTERVAL SCHEDULES.
Derek P. Hendry and P. V. Dillow (Chicago, University, Chicago, Ill.; Tennessee, University, Knoxville, Tenn.).
Journal of the Experimental Analysis of Behavior, vol. 9, July 1966, p. 337-349. 14 refs.
Research supported by the Department of Scientific and Industrial Research; Public Health Service Grant No. MH-11907-01; Grant No. NsG-189-61.

Investigation of the possibility that observing behavior could be sustained by, first, the stimuli of a chain schedule, and second, by stimuli correlated with passage of time in interval schedules. One experiment showed that the three stimuli associated with three chained fixed-interval links could be used to maintain observing behavior. Another experiment showed that three stimuli correlated with the passage of time since the last reinforcement in a fixed-interval schedule could be used to maintain observing behavior. In both experiments most observing responses occurred midway between reinforcements. Few occurred just before or just after reinforcement. A third experiment showed that the decline in the rate of observing behavior just before reinforcement was reduced when more stimuli could be observed. The relatively high terminal rate of observing behavior that resulted was maintained even when at least 4 sec intervened between the reinforcement and the last observed stimulus. M.M.

A66-42448
COMPARISON OF THE EFFECT OF THE DIRECTION OF THE GRAVITATIONAL ACCELERATION ON POST-ROTATIONAL RESPONSES IN YAW, PITCH AND ROLL.
A. J. Benson and M. A. Bodin (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
Aerospace Medicine, vol. 37, Sept. 1966, p. 889-897. 14 refs.

Labyrinthine nystagmus and the sensation of turning, evoked by impulsive stimuli in yaw, pitch, and roll, were compared when the subjects remained in the plane of rotation and when tilted through 90^{o} as soon as the turntable was stopped. In all axes, reorientation of the subject brought about a significant decrease in the duration of the post-rotational response, though this was proportionately greater in yaw than in pitch or roll. In the yaw and pitch axes the reduction in the after-sensation was greater than the decrement in the corresponding time constant of nystagmus decay. Possible mechanisms, and the implication of these results to problems of aerospace medicine, are discussed. (Author)

A66-42449
PREDOMINANT DIRECTION OF GAZE DURING SLOW HEAD ROTATION.
S. Mishkin and G. Melvill Jones (McGill University, Dept. of Physiology, Defence Research Board of Canada Aviation Medical Research Unit, Montreal, Canada).
Aerospace Medicine, vol. 37, Sept. 1966, p. 897-900. 16 refs.

Experiments with human subjects oscillated sinusoidally about a vertical axis have shown that superimposed on this familiar nystagmoid pattern of response there tends to be a slow waveform of change in the average eye position relative to the skull. In these experiments this waveform had the same frequency as the oscillatory motion of the head but was approximately 90^{o} phase advanced with respect to the waveform of head position. This implies that during the sinusoidal head motion the waveform defining averaged eye position relative to the skull was approximately in phase with head angular velocity. Since the semicircular canal functions as an angular velocity transducer over the frequency range employed in these experiments, it is inferred that the observed waveform of averaged eye displacement probably derived in the main from this vestibular source. (Author)

A66-42450
ANGIOCARDIOGRAPHIC AND HEMODYNAMIC STUDY OF TRANSVERSE (G_x) ACCELERATION.
Harold Sandler (NASA, Ames Research Center, Moffett Field, Calif.).
Aerospace Medicine, vol. 37, Sept. 1966, p. 901-910. 27 refs.

Cardiopulmonary hemodynamics were studied in dogs during acceleration at $+5G_x$, $+10G_x$, and $+15G_x$ on the dynamic flight simulator at the Aerospace Medical Research Department of the U.S. Naval Air Development Center. Changes in cardiopulmonary parameters were correlated with changes in the heart and lungs recorded by cineradiography and cineangiocardiography using a 9-in. image intensifier X-ray system. Decreases in cardiac output and stroke volume were recorded by dye dilution techniques in all animals and confirmed by cineangiocardiographic studies. A marked and consistent fall in arterial oxygen saturation was also recorded. The role of atelectasis as the cause for this fall in oxygen saturation was discussed. (Author)

A66-42451 #
BIOMEDICAL MONITORING DURING DYNAMIC STRESS TESTING. I - INSTRUMENTATION AND NORMAL VALUES.
Frederick W. Fascenelli, Charles Cordova, David G. Simons, Jack Johnson, Lester Pratt, and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, Sept. 1966, p. 911-922. 6 refs.
NASA Contract No. T 16765(G).

With the advent of manned space flight, it has become increasingly important to be able to assess the physiologic state by remote means. This has created a requirement to be able to use essentially atraumatic external sensors providing simultaneous measurements of the vital functions during activity. To obtain this information, a group of 223 subjects from USAF flight crews between the ages of 25 and 35 were monitored with specialized equipment during rest and during various forms of stress testing. This report describes the data acquisition system that was operated and the methods used for measurement. Normal values of physiologic functions for subjects instrumented in this manner have been computed and are also presented. (Author)

A66-42452 #
BIOMEDICAL MONITORING DURING DYNAMIC STRESS TESTING. II - THE LEVY HYPOXIA TEST.
Fred W. Fascenelli and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, Sept. 1966, p. 923-927.
NASA Contract No. T 16765(G).

Apparently healthy aircrew members between the ages of 25 and 35 years were studied with the Levy hypoxia test during dynamic stress test monitoring technics. The principal changes noted were those associated with arterial oxygen desaturation. The compensatory mechanisms to short-term hypoxia were accomplished by the cardiovascular system and measurements indicated that this was achieved through increased cardiac output. The increased cardiac work and arterial oxygen desaturation combined to present a significant stress test for the adequacy of coronary circulation. (Author)

A66-42453 ≐
BIOMEDICAL MONITORING DURING DYNAMIC STRESS TESTING.
III - MAXIMUM EXERCISE TOLERANCE - ERGOMETER.
Fred W. Fascenelli and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, Sept. 1966, p. 928-935.
NASA Contract No. T 16765(G).

Apparently healthy aircrew members between the ages of 25 and 35 years were studied during a maximum exercise tolerance test using dynamic stress testing monitoring technics. The median exercise time on the ergometer was 12 min more than 84% of the subjects performed between 10 and 14 min. In healthy adult males the exercise limit is usually set by the cardiac output since the ventilatory requirements are far below the limits of maximum breathing capacity tests. (Author)

A66-42454 #
BIOMEDICAL MONITORING DURING DYNAMIC STRESS TESTING.
IV - FLACK TEST.
Fred W. Fascenelli and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, Sept. 1966, p. 935-939.
NASA Contract No. T 16765 (G).

Apparently healthy aircrew members between the ages of 25 and 35 years were studied with the Flack Test using dynamic stress test monitoring technics. The heart rate shows a classic response to the Flack Test. Some of the integrated intervals (A-H, S_1O-A, E-H, and E-A) showed a continuing decrease during the recovery period. The reason for these changes are not evident at this time. (Author)

A66-42455 #
BIOMEDICAL MONITORING DURING DYNAMIC STRESS TESTING.
V - TILT TABLE ORTHOSTATIC TOLERANCE TEST.
Fred W. Fascenelli and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, Sept. 1966, p. 939-942. 6 refs.
NASA Contract No. T 16765 (G).

Apparently healthy aircrew members between the ages of 25 and 35 were studied with a tilt table procedure using dynamic stress test monitoring technics. The principal changes noted were those directly related to the change in heart rate (E-S_2O and S_1O-S_2O) and a shortening of mechanical systole. (Author)

A66-42456
EFFECTS OF MEPROBAMATE AND HYPOXIA ON PSYCHOMOTOR PERFORMANCE.
Tulio R. Figarola and Charles E. Billings (Ohio State University, Dept. of Preventive Medicine, Aviation Medicine Research Laboratory, Columbus, Ohio).
(Aerospace Medical Association, Annual Meeting, 36th, New York, N.Y., Apr. 28, 1965, Paper.)
Aerospace Medicine, vol. 37, Sept. 1966, p. 951-954. 10 refs.
Research supported by the Ohio State University.

This study was designed to assess the effects of meprobamate, alone and combined with hypoxia, on the ability of normal human subjects to perform several complex psychomotor tasks simultaneously. Six male subjects were required to perform a bidimensional tracking task, to solve coded problems, and to respond to infrequent changes in the intensity of an auditory signal. The tasks were performed for 36 min on six occasions while subjects were taking either meprobamate, 400 mgm three times daily, or a matched placebo. While taking drug or placebo, subjects were exposed in an altitude chamber to either 3000, 8000, or 17,000 ft pressure altitude on three separate days. Performance was assessed under each of the six possible combinations of drug (or placebo) and altitude. The results indicate that meprobamate in this dosage exerts a decremental effect on certain elements of complex task performance. This effect is approximately additive to the decremental effect of hypoxia. The effect of meprobamate was obvious only during periods when subjects were relatively heavily loaded; it was not significant during periods when subjects were performing the tracking task alone. (Author)

A66-42457
NEURO-OPHTHALMIC AND AEROMEDICAL IMPLICATIONS OF INTERNAL CAROTID ARTERY INSUFFICIENCY.
Ludwig G. Lederer (American Airlines, Inc., New York, N.Y.), M. Frederick Leeds (Pan American World Airways, Inc., San Francisco, Calif.), Paul M. Pratho (American Airlines, Inc., Fort Worth, Tex.), and Stanley Diamond.
Aerospace Medicine, vol. 37, Sept. 1966, p. 954-958. 8 refs.

Three case reports are presented which illustrate the aviation implications of internal carotid artery insufficiency, manifested by neurological and neuro-ophthalmic findings. The value of ophthalmodynamometry in diagnosis and prognosis to help settle the very difficult question of flight qualification is shown in these cases. In two pilots returned to flight status, there were no neurological deficits, and good cerebral circulation was present as shown by EEG studies, ophthalmodynamometry, and neurological observation. They were examples of nonstroke, transient, and reversible cerebral ischemia. Thorough and complete diagnostic studies should be done to identify remedial defects. Every effort should be made to return these pilots to flight status, consistent with the principles of flight safety. Ophthalmodynamometry is valuable as one of the indicators of adequate collateral cerebral circulation. (Author)

A66-42458
ALCOHOL-INDUCED HYPOGLYCEMIA AS A FACTOR IN AIRCRAFT ACCIDENTS.
Harry L. Gibbons, Judith L. Plechus, Evelyn H. Chandler, and John W. Ellis (Federal Aviation Agency, Fort Worth, Tex.).
Aerospace Medicine, vol. 37, Sept. 1966, p. 959-961. 28 refs.

A case history of an aircraft accident is presented. The apparent cause of the accident was incapacitation secondary to marked hypoglycemia (blood glucose level was 20 mg percent and blood alcohol level was 98 mg percent). Alcohol induced hypoglycemia (AIH) is mentioned frequently in the literature. Since 30% of fatal aircraft accidents in the FAA's Southwest Region have alcohol involved, an investigation was undertaken to evaluate the role of associated hypoglycemia in these accidents as a possible contributing factor. Due to the post mortem changes in blood glucose levels, the data are considered unreliable and no conclusions were reached regarding the frequency of AIH. A phenomenon of agonal hypoglycemia is suggested, and the role of AIH in diabetes is mentioned. (Author)

A66-42575
EFFECTS OF VIBRATION ON MAN.
J. C. Guignard (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).
(SOCIETY OF ENVIRONMENTAL ENGINEERS, SYMPOSIUM ON ENVIRONMENTAL ENGINEERING AND ITS ROLE IN SOCIETY, 2ND, IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY, LONDON, ENGLAND, APRIL 19-21, 1966. VOLUME 1 - ENVIRONMENTAL EFFECTS ON MAN.)
Journal of Environmental Sciences, vol. 9, Aug. 1966, p. 29-32. 15 refs.
[For abstract see issue 18, page 3062, Accession no. A66-34202]

A66-42669
CRITERIA FOR THE DETECTION OF BIOLOGICAL SYSTEMS.
Elie A. Shneour (Stanford University, Stanford, Calif.).
IN: UNMANNED EXPLORATION OF THE SOLAR SYSTEM; AMERICAN ASTRONAUTICAL SOCIETY, SYMPOSIUM ON UNMANNED EXPLORATION OF THE SOLAR SYSTEM, DENVER, COLO., FEBRUARY 8-10, 1965, PROCEEDINGS. [A66-42653 24-30]
Edited by G. W. Morgenthaler and R. G. Morra.
Baltimore, American Astronautical Society; North Hollywood, Calif., Western Periodicals Co. (Advances in the Astronautical Sciences. Volume 19), 1965, p. 215-223. 6 refs.
Grant no. NsG-81-60.

Major guidelines for the investigation of the probabilities of extraterrestrial life from the point of view of biology. The search for such life introduces a formidable new and unknown dimension into the biological sciences. The following generalizations are offered as a first approximation of the criteria for the detection of extraterrestrial biological systems: (1) evolution through natural

selection, (2) absence of a specific single test for life, (3) planetary distribution of life; (4) life abundance threshold, (5) uniformity of basic characteristics, (6) radiant energy requirements for life, (7) redox energy transfers, (8) solvent systems, (9) molecular asymmetry, and (10) macromolecular instability. S. Z.

A66-42670
THE GOAL OF EXPERIMENTAL BIOLOGY IN SPACE.
Robert G. Lindberg (Northrop Corp., Northrop Space Laboratories, Bioastronautics Laboratory, Hawthorne, Calif.).
IN: UNMANNED EXPLORATION OF THE SOLAR SYSTEM; AMERICAN ASTRONAUTICAL SOCIETY, SYMPOSIUM ON UNMANNED EXPLORATION OF THE SOLAR SYSTEM, DENVER, COLO., FEBRUARY 8-10, 1965, PROCEEDINGS. [A66-42653 24-30]
Edited by G. W. Morgenthaler and R. G. Morra.
Baltimore, American Astronautical Society; North Hollywood, Calif., Western Periodicals Co. (Advances in the Astronautical Sciences. Volume 19), 1965, p. 225-235.

Discussion of the general goals and potential contributions of experimental biology in space research. Space biology can be divided into exobiology (the search for and control of extraterrestrial life), and biomedical research (the study of the effect of space residence on terrestrial life). The latter can be divided further into space medicine, which is specifically concerned with man in space, and experimental biology, in which forms of life other than the human are studied. As yet there is a shortage of definitive data regarding the effects of environmental factors on living things, even on the earth. The solar system is characterized by a gaseous environment, ranging from the near vacuum of space to planetary atmospheres; gravitational fields ranging from weightlessness to many g on the surfaces of large planets; varying magnetic fields; and patterns of interacting astrophysical forces strange to terrestrial life. Simulation of those space conditions that can be modeled in terrestrial laboratories prior to experimentation in space is imperative. W.A.E.

A66-42671
THE AUTOMATED BIOLOGICAL LABORATORY.
Temple W. Neumann (Philco Corp., Aeronutronic Div., Newport Beach, Calif.).
IN: UNMANNED EXPLORATION OF THE SOLAR SYSTEM; AMERICAN ASTRONAUTICAL SOCIETY, SYMPOSIUM ON UNMANNED EXPLORATION OF THE SOLAR SYSTEM, DENVER, COLO., FEBRUARY 8-10, 1965, PROCEEDINGS. [A66-42653 24-30]
Edited by G. W. Morgenthaler and R. G. Morra.
Baltimore, American Astronautical Society; North Hollywood, Calif., Western Periodicals Co. (Advances in the Astronautical Sciences. Volume 19), 1965, p. 237-251.

Discussion of the development concept of an automated biological laboratory (ABL) for gathering detailed information on the biological and related environmental characteristics of the planets, with initial missions to Mars planned for the early 1970's. Objectives to be accomplished by such an ABL include not only detection of biological forms but also of their characteristics, such as a measure of the basic chemistry, structure, metabolism, distribution, mobility, and growth of any existing forms. One purpose of the ABL is to provide the analytical tools for a variety of comprehensive tests on suspected life samples, rather than a single, possibly inconclusive test. Sufficient measurements must be taken of the local environmental parameters to permit proper interpretation of the biological data. At the same time, the ABL must be adequately sterilized before landing to prevent contamination of any alien environment by terrestrial biological factors. W.A.E.

A66-42672
THE OBJECTIVES AND TECHNOLOGY OF SPACECRAFT STERILIZATION.
Lawrence B. Hall, James R. Miles, Carl W. Bruch, and Paul Tarver (NASA, Office of Space Science and Applications, Washington, D.C.).
IN: UNMANNED EXPLORATION OF THE SOLAR SYSTEM; AMERICAN ASTRONAUTICAL SOCIETY, SYMPOSIUM ON UNMANNED EXPLORATION OF THE SOLAR SYSTEM, DENVER, COLO., FEBRUARY 8-10, 1965, PROCEEDINGS. [A66-42653 24-30]
Edited by G. W. Morgenthaler and R. G. Morra.
Baltimore, American Astronautical Society; North Hollywood, Calif., Western Periodicals Co. (Advances in the Astronautical Sciences. Volume 19), 1965, p. 253-258.

Study of the detection and removal of microscopic and submicroscopic life from a spacecraft for a Mars mission. NASA is approaching the problem of sterilization by: (1) the development of sterilizable flight hardware; (2) reduction of biological loading of the lander; (3) surface and internal sterilization of the lander; and (4) protection of the lander from recontamination. Hardware must be qualified by heating three times to 145°C for 36 hr. The problem of components withstanding this heat is discussed. The sterile spacecraft must be encased in a protective container during final test and launch. M.F.

A66-42673
LIMITATIONS IN DESIGNING LIFE DETECTION EXPERIMENTS.
Gerald A. Soffen (California Institute of Technology, Jet Propulsion Laboratory, Space Sciences Div., Pasadena, Calif.).
IN: UNMANNED EXPLORATION OF THE SOLAR SYSTEM; AMERICAN ASTRONAUTICAL SOCIETY, SYMPOSIUM ON UNMANNED EXPLORATION OF THE SOLAR SYSTEM, DENVER, COLO., FEBRUARY 8-10, 1965, PROCEEDINGS. [A66-42653 24-30]
Edited by G. W. Morgenthaler and R. G. Morra.
Baltimore, American Astronautical Society; North Hollywood, Calif., Western Periodicals Co. (Advances in the Astronautical Sciences. Volume 19), 1965, p. 261-288. 8 refs.

Discussion of the limitations of carrying out experiments to determine whether there is extraterrestrial biology to be studied. The early Mars landing missions which are primarily of biological interest are dependent upon certain choices with respect to the size of the payloads, the destination, the site selection, the planetary seasons, and the longevity of the experiment. The experimental design is related to that choice and also to certain other limitations unique to carrying out planetary biological investigation. Both aspects are discussed. M.F.

A66-42674
IMPLANT TRANSDUCERS AND BIOLOGICAL RHYTHMS - ON EARTH AND IN SPACE.
W. Ko (Case Institute of Technology, Cleveland, Ohio), O. Lindan (Highland View Hospital; Western Reserve University; Case Institute of Technology, Cleveland, Ohio), and J. B. Reswick (Case Institute of Technology, Engineering Design Center, Cleveland, Ohio).
IN: UNMANNED EXPLORATION OF THE SOLAR SYSTEM; AMERICAN ASTRONAUTICAL SOCIETY, SYMPOSIUM ON UNMANNED EXPLORATION OF THE SOLAR SYSTEM, DENVER, COLO., FEBRUARY 8-10, 1965, PROCEEDINGS. [A66-42653 24-30]
Edited by G. W. Morgenthaler and R. G. Morra.
Baltimore, American Astronautical Society; North Hollywood, Calif., Western Periodicals Co. (Advances in the Astronautical Sciences. Volume 19), 1965, p. 289-310. 5 refs.

Attempt to illustrate how earthbound experimentation into the dynamics of the living system can yield both technique and insight which will help extend knowledge of biology in outer space. Two specific areas are covered: (1) implanted transducers or the development and application of miniaturized biotelemetering instrumentation for gaining continuous information on the living system with a minimum of disturbance to the experimental subject; and (2) biological rhythms or the utilization of advanced instrumental techniques and methods of engineering analysis in the design of experiments and in fundamental studies of the functions and rhythms of metabolism. M.F.

A66-42675
THE NASA BIOSATELLITE PROGRAM.
Dale W. Jenkins (NASA, Office of Space Science and Applications, Bioscience Programs Office, Washington, D.C.).
IN: UNMANNED EXPLORATION OF THE SOLAR SYSTEM; AMERICAN ASTRONAUTICAL SOCIETY, SYMPOSIUM ON UNMANNED EXPLORATION OF THE SOLAR SYSTEM, DENVER, COLO., FEBRUARY 8-10, 1965, PROCEEDINGS. [A66-42653 24-30]

Edited by G. W. Morgenthaler and R. G. Morra.
Baltimore, American Astronautical Society; North Hollywood, Calif., Western Periodicals Co. (Advances in the Astronautical Sciences. Volume 19), 1965, p. 311-324. 6 refs.

Description of the Biosatellite Program - a second-generation series of carefully planned and selected experiments, including some highly sophisticated experiments, which have required several years of baseline study and equipment development. Twenty experiments have been selected for flight to study the effects of weightlessness and decreased gravity during 3- to 30-day orbital periods. The experiments include a wide variety of plants and animals, from single-cell organisms to higher plants and animals. The effects of weightlessness will be studied on the primate, especially the central nervous, the cardiovascular, and the skeletal systems during orbits of 30 days duration. M.F.

A66-42676
DETECTION OF MICROORGANISMS ON THE PLANET MARS.
Wolf Vishniac (Rochester, University, Rochester, N.Y.) and Dale E. Buckendahl (Ball Brothers Research Corp., Boulder, Colo.).
IN: UNMANNED EXPLORATION OF THE SOLAR SYSTEM; AMERICAN ASTRONAUTICAL SOCIETY, SYMPOSIUM ON UNMANNED EXPLORATION OF THE SOLAR SYSTEM, DENVER, COLO., FEBRUARY 8-10, 1965, PROCEEDINGS. [A66-42653 24-30]
Edited by G. W. Morgenthaler and R. G. Morra.
Baltimore, American Astronautical Society; North Hollywood, Calif., Western Periodicals Co. (Advances in the Astronautical Sciences. Volume 19), 1965, p. 325-336.
Grant No. NsG-209.

Discussion of the difficulties inherent in the design of an instrument that must detect living organisms considering a mission to the planet Mars as an example. It is assumed that there are counterparts of terrestrial microorganisms which have photosynthetic and respiration cycles in inorganic compounds other than oxygen. The "Wolf Trap" instrument is designed to land on the surface of Mars, acquire a soil sample with a vacuum system, and transport the sample to various culture media. Multiplying microorganisms would produce characteristic time changes in pH and turbidity. M.F.

A66-42742
PERFORMANCE TESTING IN SPACE - A MANIFOLD PROGRAM OF OPERATIONS FOR A GEMINI 11 TEST FLIGHT [LEISTUNGSPRÜFUNG IM WELTRAUM - VIELSEITIGES ARBEITSPROGRAMM BEIM TEST-FLUG GEMINI 11].
Gert Weiss.
Astronautik, vol. 3, July-Aug. 1966, p. 114-116. In German.

Preflight consideration of the astronaut performance-testing program for the Gemini 11 orbiting flight of Conrad and Gordon. Manual operations of the astronauts during the flight and some of the aids they employed are discussed. V.Z.

A66-42779 #
LIFE SUPPORT SYSTEMS DATA FROM SIXTY-TWO DAYS OF TESTING IN A MANNED SPACE LABORATORY SIMULATOR.
T. C. Secord (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Advance Biotechnology Dept., Santa Monica, Calif.) and M. S. Bonura (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Advance Biotechnology Dept., Life and Environmental Systems Development Section, Santa Monica, Calif.).
(AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS, p. 306-317.)
Journal of Spacecraft and Rockets, vol. 3, Oct. 1966, p. 1527-1533. 10 refs.
Research sponsored by the Douglas Independent Research and Development Program.
[For abstract see issue 02, page 186, Accession no. A66-11646]

A66-42853
EXPLOSIVE LENS FLASHBLINDNESS PROTECTION SYSTEM.
D. D. Scott (Johns Hopkins University, Applied Physics Laboratory, Space Life Sciences Group, Silver Spring, Md.) and L. M. Snider (U.S. Navy Material Command, Naval Air Systems Command, Astronautics Div., Washington, D.C.).
APL Technical Digest, vol. 5, July-Aug. 1966, p. 11-16.

Outline of the development of an automatic, explosively actuated, sequenced, protective system designed to minimize the effects of flashblindedness and prevent thermal injury to the eyes. The system consists of a Navy APH-5 flight helmet modified to support the explosive light filter (ELF) goggle lens; a sensing device used to detect a nuclear-detonated electromagnetic radiated signal; and a battery-operated discriminator unit connected electrically to the lens and sensor. Data reduced from a high-speed framing-camera exposure is plotted to show the actual time history of a closure sequence. B.B.

A66-42857
SPEECH COMMUNICATIONS EFFECTS AND TEMPORARY THRESHOLD SHIFT REDUCTION PROVIDED BY $V_{51}R$ AND SELECTONE-K EARPLUGS UNDER CONDITIONS OF HIGH INTENSITY IMPULSIVE NOISE.
R. R. A. Coles (Southampton, University, Institute of Sound and Vibration Research, Southampton; Royal Naval Medical School, Audiology Dept., Alverstoke, Hants., England) and C. G. Rice (Southampton, University, Institute of Sound and Vibration Research, Southampton, England).
Journal of Sound and Vibration, vol. 4, Sept. 1966, p. 156-171. 19 refs.
Research sponsored by the Medical Research Council.

The pure tone and speech attenuation characteristics of British-made earplugs have been measured in the laboratory, and their effects on speech communication have also been measured under field conditions of quiet and impulsive noise backgrounds. Using a temporary threshold shift (TTS) technique, the protection provided by the plugs has been examined for two separate high intensity impulsive noise sources, one of short duration presented in a free field, the other of longer duration in a reverberant field. The results have shown that after further development a new plug of the low-pass filter type could offer advantages over existing plugs in respect of communication and comfort. While the low-pass filter plug is not as efficient an ear defender under longer duration impulsive noises, nevertheless for very short impulses, such as that produced by small-arms fire in the open, the protection is considered to be adequate. (Author)

A66-43025
NEW ASPECTS OF VISUAL PERCEPTION THRESHOLDS.
George A. Hay (Leeds, University, Dept. of Medical Physics, General Infirmary, Leeds, England).
Nature, vol. 211, Sept. 24, 1966, p. 1380, 1381. 13 refs.

Criticism of the Rose and Morgan theories concerning the perception of image detail by the eye. It is shown that although the Morgan model of image perception, in which the effective noise amplitude is presumed to be constant for a given event flux density and independent of the size of the detail, is conceptually more plausible and satisfying than the Rose model, in which the effective noise must be assumed to change from instant to instant as the attention of the observer turns to detail of varying size, the introduction of the Morgan model leaves a number of important points unresolved. On the basis of the criticism of these two theories a third type of hypothesis is suggested to account for visual perceptive thresholds; it is assumed that the available experimental evidence and the objections raised by Morgan can be accounted for, at least in the spatial domain, by adopting a hypothesis of visual perception thresholds based on the Wiener or power spectrum of the noise in relation to the Fourier transform of the relevant image detail, the noise amplitude being determined in principle on the basis of Morgan's model. A.B.K.

A66-43081 #
INFORMATION PROCESSING AND DATA COMPRESSION FOR EXOBIOLOGY MISSIONS.
Louis L. Sutro (Massachusetts Institute of Technology, Instrumentation Laboratory, Cambridge, Mass.).
American Astronautical Society, Annual Meeting, 12th, Anaheim, Calif., May 23-25, 1966, Paper. 31 p. 15 refs.
Contract No. NSR-22-009-138.

Discussion of the requirements and design characteristics of a self-moving probe capable of exercising a certain type of judgment and handling a variety of contingencies, to be carried on a Martian exploration vehicle. Three development programs are described -

(1) a cell which responds to any small dark object moving centripetally into its responsive field, (2) a stereoscopic system to discriminate objects by a pair of TV cameras and a computer, and (3) a decision and control system incorporating modules each of which is capable of processing input data and making an optimum estimate of what the corresponding output mode should be. In the control device each module takes the information from all other modules and combines it in a nonlinear fashion with input data directly received. D.P.F.

A66-43098
RELATIONSHIPS OF NEURONAL SPIKE POPULATIONS AND EEG ACTIVITY IN CHRONIC CATS.
Jennifer S. Buchwald, Edward S. Halas, and Sharon Schramm (California, University, School of Medicine, Dept. of Pediatrics and Dept. of Anatomy, and Center for Health Sciences, Brain Research Institute, Los Angeles, Calif.).
Electroencephalography and Clinical Neurophysiology, vol. 21, 1966. 12 p. 22 refs.
U.S. Public Health Service Grant No. NB-05437; Grant No. NsG 237-62.

Evaluation of simultaneous recordings made through the same electrode of action potential populations and EEG slow wave activity at cortical and subcortical sites in chronic, unrestrained cats. Three combinations of spontaneous, multiple-unit, and EEG activity are recorded: (1) altered unit discharge with no change in EEG activity, (2) altered EEG activity with no change in unit activity, and (3) correlation with the EEG of bursts of unit discharge during large amplitude, rhythmic EEG waves. B.B.

A66-43099
CATHEPSIN C - A CHLORIDE-REQUIRING ENZYME.
J. Ken McDonald, Thomas J. Reilly, Benjamin B. Zeitman, and Stanley Ellis (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).
Biochemical and Biophysical Research Communications, vol. 24, no. 5, 1966, p. 771-775. 25 refs.

Discussion of the finding of a Cl^- requirement for cathepsin C. The requirement was exhibited for the hydrolysis of Gly-Phe-NH_2, Gly-Phe-p-nitroanilide, and Gly-Phe-β-naphthylamide at pH 5.3. The Cl requirement appeared to be absolute, and to apply also to the transferase activity of cathepsin C at pH 6.8. A thiol activation of cathepsin C could not be demonstrated in the absence of Cl^-. B.B.

A66-43102
MOLECULAR AND ULTRASTRUCTURAL CORRELATES OF FUNCTION IN NEURONS, NEURONAL NETS, AND THE BRAIN.
Francis O. Schmitt (Massachusetts Institute of Technology, Dept. of Biology, Cambridge, Mass.).
Naturwissenschaften, vol. 53, no. 3, 1966, p. 71-79. 79 refs.
Research supported by the Rogosin Foundation, the Louis and Eugenie Marron Foundation, and the Trustees under the wills of Charles A. and Marjorie King; National Institutes of Health Grants No. GM-10211-03; No. NB-00024-15; Grant No. NsG-462; Contract No. Nonr-1841(27).

Application of genetic and immunological concepts and techniques to the study of the engram as a macromolecular entity. The discussion is restricted to the storage, transfer, and readout of information in molecules and their aggregates. Experience and information deriving from molecular genetics and molecular immunology are invoked in an attempt to develop a comprehensive system of molecular neurology. The special role of junctions is discussed, and neurons are studied as prototypical molecular recognition systems. Plastic, non-RNA-directed synthesis of peptides and proteins is considered, and the delocalization problem is analyzed. B.B.

A66-43130
SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966. 462 p. In Russian.

CONTENTS:

A66-43134 #
MAIN PROBLEMS OF SPACE BIOLOGY AND MEDICINE [OSNOVNYE ZADACHI KOSMICHESKOI BIOLOGII I MEDITSINY].
V. I. Iazdovskii.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].

Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 61-67. In Russian.

Study of the biological effect of various space factors on living organisms. The factors involved are divided into three groups. The first is characterized by low barometric pressure, absence of molecular oxygen, unfavorable temperature conditions, ionizing radiation, and meteoric hazards; the second by such factors as noise, vibration, acceleration, and weightlessness; and the third by such psychological factors as prolonged confinement in a spacecraft cabin, the artificial atmosphere, peculiarities in feeding, emotional stress, etc. A.B.K.

A66-43135 #
MAIN STAGES OF DEVELOPMENT OF SPACE BIOLOGY AND MEDICINE IN THE USSR [OSNOVNYE ETAPY RAZVITIIA KOSMICHESKOI BIOLOGII I MEDITSINY V SSSR].
V. I. Iazdovskii.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGII I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 68-104. In Russian.

Study of the biological effects observed in dogs in suborbital flight vehicles and artificial earth satellites. The results of seven, progressively more complex studies of the behavior of dogs in space flight are cited, showing the gradual transition from low-altitude rockets, to higher-altitude rockets, to nonrecoverable artificial satellites, to manned space vehicles. A.B.K.

A66-43136 #
PROLONGED ACCELERATIONS - G-FORCES [DLITEL'NO DEISTVUIUSHCHIE USKORENIIA - PEREGRUZKI].
P. V. Vasil'ev and A. R. Kotovskaia.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 105-137. 124 refs. In Russian.

Study of the physiological disturbances caused by the action of prolonged accelerations on the human organism. A brief description is given of the four main types of accelerations. The results of studies of the effect of g-forces on the central nervous system, the respiration and gaseous metabolism, and the cardiovascular system of the human organism are cited. The problem of the maximum g-force tolerance level in humans is considered from both the biological and physiological standpoints, and methods of increasing this level are suggested. A.B.K.

A66-43137 #
IMPACT ACCELERATIONS - G-FORCES [UDARNYE USKORENIIA - PEREGRUZKI].
S. A. Gozulov.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 138-157. 33 refs. In Russian.

Detailed study of the physiological and biomechanical reactions of human subjects exposed to the action of g-forces. The characteristics of impact accelerations and the special features of their action on human organisms are discussed. A number of test stands for simulating the action of g-forces are described; these include a vertical catapult, a horizontal catapult on rails, a rocket carriage on rails, a falling platform, and a landing test stand. The reactions of a human organism to the action of impact g-forces are considered. An attempt is made to ascertain the maximum g-forces that can be withstood by a human organism. A study is also made of the biomechanical reactions of the body at the moment of impact and of the changes occurring in the physiological functions. The mechanism of action of g-forces on a human organism is divided into four stages of functional disturbance, which are considered separately. Methods of increasing the ability of a human organism to withstand g-forces are suggested. A.B.K.

A66-43138 #
WEIGHTLESSNESS [NEVESOMOST'].
I. I. Kas'ian, V. I. Kopanev, and V. I. Iazdovskii.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 158-198. 140 refs. In Russian.

Study of the reactions of human organisms under conditions of partial and complete weightlessness. Detailed investigations are made of the sensory, motor, and vegetative reactions of human organisms under conditions of weightlessness aboard orbiting spacecraft or aircraft flying along a parabolic trajectory. An assessment is made of the ability of the human organism to adapt to or to compensate for the effects of weightlessness. An analysis is made of the working capacity of a number of Soviet cosmonauts aboard orbiting satellites under conditions of weightlessness. Certain physiological mechanisms of action of weightlessness on the human organism are discussed, and methods of reducing the adverse effects of weightlessness are suggested. A.B.K.

A66-43140 #
BIOLOGICAL EFFECT OF COSMIC RADIATION [BIOLOGICHESKOE DEISTVIE KOSMICHESKOI RADIATSII].
V. G. Vysotskii.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 216-259. 332 refs. In Russian.

Survey of the degree of radiation hazard to astronauts resulting from the various types of electromagnetic and corpuscular radiation. Particular attention is given to the effects of X rays, gamma rays, low- and high-frequency radio waves, and UV and IR radiation. Tabulated results obtained with dogs indicate that only a small portion of the entire spectrum of electromagnetic radiation originating in cosmic space presents a serious hazard to man. With respect to corpuscular radiation, the effect of electrons during passage through the radiation belts can, under certain circumstances, greatly reduce the functioning and capacity for work of astronauts. The biological effects of neutrons, protons, and heavy nuclei are examined, and results obtained with animals are tabulated. The factors that affect biological reactions during space flight are discussed, with particular reference to nonuniformity of radiation, depth of penetration of radiation doses, and the strength and fractionation of the dose. The relative biological effectiveness of various types of ionizing radiation is compared in tabular form with that of X rays and gamma radiation. Admissible irradiation levels are defined, and pharmacochemical methods of biological protection are outlined. V.P.

A66-43141 #
METHODS OF MEDICO-BIOLOGICAL INVESTIGATIONS DURING SPACE FLIGHT [METODY MEDIKO-BIOLOGICHESKIKH ISSLEDOVANII V KOSMICHESKOM POLETE].
R. M. Baevskii and V. I. Iazdovskii.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 260-284. 31 refs. In Russian.

Discussion of medico-biological methods based on (1) data recording on board rockets and spacecraft and (2) telemetering of information to the earth. The specific features of onboard biotelemetering equipment are outlined, together with methods of physiological investigation in space conditions, such as electrocardiography, kinetocardiography, phonocardiography, arterial oscillography, sphygmography, pneumography, electromiography, actography, thermometry, electroencephalography, dynamography, and recording of written-speech signals. Methods of analysis and processing of biotelemetering information are described, and the problem of transmitting medico-biological information during long missions is examined. V.P.

A66-43142 #
ARTIFICIAL ATMOSPHERE OF SPACECRAFT CABINS [ISSKUSSTVENNAIA ATMOSFERA KABIN KOSMICHESKIKH KORABLEI].
S. G. Zharov, V. V. Kustov, A. D. Seriapin, and A. G. Fomin.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].

Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 285-297. 70 refs. In Russian.

Discussion of the considerations involved in the creation of regenerative air-conditioning systems of spacecraft cabins for long missions. An analysis of the principal parameters of the gas mixture and their limits that would provide the necessary life and working conditions for man leads to the following requirements for the cabin atmosphere: an absolute gas pressure from 300 to 900 mm Hg, a partial oxygen pressure from 150 to 300 mm Hg, a partial carbon dioxide pressure of maximum 7.6 mm Hg and a relative humidity from 30 to 70% at a temperature of 20 ± 5°C (temperature should be controllable between 10 and 30°C). The rate of gas-mixture pressure variation should not exceed 2 mm Hg/sec in the regulating process. V.P.

A66-43143 #
LIFE-SUPPORT SYSTEMS IN SPACECRAFT CABINS BASED ON THE USE OF PHYSICOCHEMICAL METHODS [SISTEMY ZHIZNEOBESPECHENIIA CHELOVEKA V KABINAKH KOSMICHESKIKH KORABLEI S ISPOL'ZOVANIEM FIZIKO-KHIMICHESKIKH METODOV].
A. D. Seriapin, A. G. Fomin, and S. V. Chizhov.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 298-329. 46 refs. In Russian.

Discussion of methods of creating regenerative air-condition systems in hermetically closed space cabins. The weight characteristics of 10 representative closed, partially closed, and open regenerative systems are examined. The open regenerative system employed by the satellites of the Vostok series is described, with particular attention to the automatic systems for sustaining the required gas composition of the air, air humidity, and cabin temperature and to controlling the basic parameters of the gas medium. For partially closed and closed systems, discussion is included of the regeneration of carbon dioxide with subsequent electrolysis of water, the decomposition of carbon dioxide under the effect of UV radiation, the production of oxygen with the aid of an electrolytic moisture absorber, and of the principal chemical reactions involved. A discussion of water regeneration methods is included. V.P.

A66-43144 #
LIFE-SUPPORT SYSTEM IN SPACECRAFT CABINS ON THE BASIS OF THE BIOLOGICAL CIRCULATION OF SUBSTANCES [SISTEMY ZHIZNEOBESPECHENIIA CHELOVEKA V KABINAKH KOSMICHESKIKH KORABLEI NA OSNOVE BIOLOGICHESKOGO KRUGOVOROTA VESHCHESTV].
E. Ia. Shepelev.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 330-362. 95 refs. In Russian.

Outline of the general principles of operation of a life-support system and review of several characteristics of the natural circulation of substances. The trends and prospects of realizing the biological circulation of substances in closed localized volumes are discussed. The material balance of the systems is calculated on the basis of the biological circulation of substances for closed volumes. Possible means are indicated of providing life-support in space missions by creating an artificial system of substance circulation which incorporates all material and energy requirements of man. M.F.

A66-43145 #
SAFETY IN SPACE FLIGHTS [OBESPECHENIE BEZOPASNOSTI KOSMICHESKIKH POLETOV].
S. A. Gozulov and L. G. Golovkin.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGII. I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 363-391. 37 refs. In Russian.

Discussion of the survival and safety problems in manned space flights. Standard preflight safety measures are reviewed together with emergency life-preservation systems, such as protection from hostile environmental factors, means of abandoning the spaceship and landing on the earth, means of keeping afloat, radio communications, signalling, and medical aid. The characteristics of Soviet and American spacesuits for use in the spacecraft and in "space walks" are examined, together with the block diagram of a regenerative spacesuit. The type of parachutes, ejectable seats, and capsules for use in emergency cases are described, together with methods of achieving a soft landing on soil or water. Means of life-preservation after landings in remote unpopulated areas are noted. V.P.

A66-43146 #
SPACE PSYCHOLOGY [KOSMICHESKAIA PSIKHOLOGIIA].
F. D. Gorbov.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 392-400. 10 refs. In Russian.

Discussion of space psychology in terms of two major problems - the psychophysiology of velocity and the ecological psychology of living and functioning in small hermetic compartments. The effects of high acceleration and velocity on the capability of an astronaut to work continuously (observing meanwhile a prescribed sequence of operations under limited time conditions) is examined, together with the effects of a change in the position of the bearing area, a change in the degree and direction of the external forces acting on the astronaut, the state of weightlessness, a sudden loss of bearing area as a result of a maneuver. V.P.

A66-43147 #
PSYCHOPHYSIOLOGICAL CAPABILITIES OF COSMONAUTS FOR CONTROLLING A SPACECRAFT AND ITS SYSTEMS - ENGINEERING PSYCHOLOGY [PSIKHOFIZIOLOGICHESKIE VOZMOZHNOSTI KOSMONAVTOV PO UPRAVLENIIU KORABLEM I EGO SISTEMAMI - INZHENERNAIA PSIKHOLOGIIA].
V. G. Denisov, V. F. Onishchenko, and V. I. Iazdovskii.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 401-444. 42 refs. In Russian.

Analysis of the problems and methods of engineering psychology, conceived as the study of the man-machine interface and its connections in a piloted spacecraft, which may be considered as a complex multichannel control system with the participation of the operator. Biomechanical "cosmonaut-spacecraft" systems are described and evaluated. The psychophysiological capabilities of the operator are evaluated in terms of his dynamic qualities, static characteristics, and senses (vision, hearing, tactile and proprioceptive sensitivity, and motor activity). Space training devices (mockups) are discussed as means of training the operator for his professional activities. The processes of the formation of professional habits for controlling a spacecraft and its systems are considered. W.A.E.

A66-43148 #
SPECIAL TRAINING OF COSMONAUTS [SPETSIAL'NAIA PODGOTOVKA KOSMONAVTOV].
N. N. Gurovskii.
IN: SPACE BIOLOGY AND MEDICINE [KOSMICHESKAIA BIOLOGIIA I MEDITSINA].
Edited by V. I. Iazdovskii.
Moscow, Izdatel'stvo Nauka, 1966, p. 445-459. 52 refs. In Russian.

Discussion of general principles and specific methods of training astronauts, on the basis of published materials and practice in the training of Soviet cosmonauts. Special training envisions a unified and continuous program for training a man for his professional activity and at the same time developing in him a high degree of resistance to conditions inherent in space flight. It is noted that even now little is known about the effects of weightlessness, accel-

eration, prolonged isolation, ionizing radiation, and other stimuli on human psychophysiological capabilities. Favorable results have been obtained by subjecting trainees to prolonged stays in isolation chambers and heat chambers, flights in aircraft in brief conditions of weightlessness, centrifuging, vestibular training, and general physical conditioning. Complex investigations and tests in a mockup of a spacecraft have also proved useful. W.A.E.

A66-43167

THE ROLE OF NEURONAL ELEMENTS IN REGIONAL CEREBRAL IMPEDANCE CHANGES IN ALERTING, ORIENTING AND DISCRIMINATIVE RESPONSES.

W. R. Adey, R. T. Kado, J. T. McIlwain, and D. O. Walter (California, University, Dept. of Anatomy, Dept. of Physiology, and Center for Health Sciences, Brain Research Institute, Los Angeles; Veterans Administration Hospital, Long Beach, Calif.).

Experimental Neurology, vol. 15, Aug. 1966, p. 490-510. 39 refs. National Institutes of Health Grant No. MH-03708; Contract No. AF 49(638)-1387; Grant No. NsG-505.

Description of measurements of electrical impedance in the hippocampus, amygdala and midbrain reticular formation during alerting, orienting, and discriminative performances in the cat. In the fully trained animal, computed averages of hippocampal impedance decreased by as much as 8% of baseline during visual discrimination, whereas alerting and orienting responses immediately preceding were not accompanied by comparable impedance changes. Similar measurements in the rostral midbrain reticular formation showed small responses during orientation and discrimination, and less constantly during alerting responses. The amygdala exhibited consistent responses only in the alerting epoch. The magnitude of the responses in hippocampus and midbrain increased with the level of behavioral performance. When behavioral cues were reversed, the hippocampal impedance response sharply increased on the first postreversal day, but rapidly declined thereafter and disappeared. M.M.

A66-43168

ACTH INDUCED CHANGES IN TRYPTOPHAN TURNOVER ALONG INDUCEABLE PATHWAYS IN MAN.

Arnold J. Mandell and Robert T. Rubin (California, University, Center for Health Sciences, Neuropsychiatric Institute, Biochemical Correlates Laboratory, Los Angeles, Calif.).

Life Sciences, vol. 5, no. 13, 1966, p. 1153-1161. 23 refs. California Department of Mental Hygiene Grant No. 64-2-40; Grant No. NsG-237-62.

Attempt to approach the problem of metabolic correlates of glucocortical induction of enzymes in man by simultaneously studying urinary excretion products of five alternative pathways of tryptophan metabolism under control conditions and conditions of increased circulating glucocorticoids. ACTH injections were the stimulus for increased glucocorticoid production, and the levels produced were similar to those shown to occur in certain psychiatric patients (Schwartz et al., 1966). The short-term turnover of metabolically insignificant amounts of C-14-labeled tryptophan was studied. S.Z.

LC ENTRIES

A66-82189
PSYCHOPHYSIOLOGICAL ANALYSIS OF ACTIVITY AS CRITERION OF SPECIAL MEDICAL PREPAREDNESS OF CREW OF SPACECRAFT "VOSKHOD-2" [PSIKHOFIZIOLOGICHESKII ANALIZ DEIATEL'NOSTI KAK KRITERII SPETSIAL'NOI MEDITSINSKOI PODGOTOVLENNOSTI EKIPAZHA KORABLIA "VOSKHOD-2"].
E. A. Karpov.
Kosmicheskie Issledovaniia, vol. 4, May–Jun. 1966, p. 469–481. 12 refs. In Russian.

The author describes in detail the pre-flight physical and psychological training of the two crew members of the Soviet spacecraft Voskhod-2, and the efficiency of their performance during space flight. One of the cosmonauts accomplished a new assignment by leaving the spacecraft and performing tasks in space. Their training included new tasks which could prepare them for the use of the air lock during extra-vehicular activity (EVA); the use of some apparatus, such as photographic cameras, in the state of weightlessness; visual orientation without help of other types of perception; and movement. The results of flight showed a very adequate type of training. In-flight recordings of pulse, respiration, electrocardiogram, and other physiological functions showed good adaptation to factors which affected vestibular functions and weightlessness. Some emotional stress was registered during preparation for EVA and manual reentry, which did not interfere with performance. In general the mission proved the efficiency of the Soviet system for selecting, through medical test, the crew which can meet all emergencies of space flight.

A66-82190
USE OF RADIATION PROTECTIVE PHARMACEUTICALS DURING SPACE FLIGHTS [K VOPROSU OB ISPOL'ZOVANII RADIOZASHCHITNYKH FARMAKOKHIMICHESKIKH SREDSTV V USLOVIIAKH KOSMICHESKIKH POLETOV].
B. I. Davydov, V. V. Antipov, V. A. Kozlov, P. P. Saksonov, and V. S. Sashkov.
Kosmicheskie Issledovaniia, vol. 4, May–Jun. 1966, p. 482–491. 28 refs. In Russian.

Experiments with mice and guinea pigs showed a decrease in acceleration tolerance 30 min. to 4 hr. after injection of 80–150 mg./kg. cystamine, 85–150 mg./kg. mercaptoalkylamines (AET), 75 mg./kg. 5-methoxytryptamine, 50 mg./kg. serotonin, or 1–10 mg./kg. aminazine. Administration of 2–10 mg./kg. phenatine or 0.05 mg./kg. strychnine produced no effect. In dogs simultaneous injection of 5–10 mg. phenatine, 0.5–1 mg. strychnine and 2.5 mg. aminazine had no effect on electrocardiogram and respiration rate after the animals were exposed to 6–8 g in a centrifuge. The chemical compounds used in this experiment had been shown to produce a good radioprotective effect during animal exposure to protons with energy of 660 and 120 Mev. However, the negative effect in acceleration stress makes it necessary to exercise caution in using these compounds during space flight.

A66-82191
EFFECT OF EXERCISE ON ELECTRICAL ACTIVITY OF CEREBRAL CORTEX AND CEREBELLUM IN VERTEBRATES [VLIIANIE FIZICHESKOI NAGRUZKI NA BIOELEKTRICHESKUIU AKTIVNOST' KORY GOLOVNOGO MOZGA I MOZZHECHKA U POZVONOCHNYKH ZHIVOTNYKH].
E. N. Klenov, N. G. Savvin, and D. I. Popova (USSR, Acad. of Sci., I. M. Sechenov Inst. of Evolutionary Physiol. and Biochem., Leningrad).
Fiziologicheskii Zhurnal SSSR, vol. 52, Jun. 1966, p. 652–659. 20 refs. In Russian.

The effect of 3–20 min. of treadmill exercise on bioelectrical activity of the cerebral cortex and the cerebellum was studied in cats, guinea pigs, and rabbits, with implanted electrodes. During the exercise and immediately after, desynchronization of rhythm was noted with lowering of potential amplitude, followed by slow rhythm which stabilized in 20–30 min. The cerebellar potential amplitude increased 2–3 times as compared with resting potential. After 30–50 min. of rest, the cortex showed slow rhythms of high amplitude which finally became stable. During recovery, synchronization of cortical and cerebellar activity took place. Complete recovery in the cerebral cortex took place 30–50 min. after the moderate exercise. In the cerebellum the effect of physical activity was noted, and recovery took place later than in the cerebral cortex.

A66-82192
BILATERALITY IN VESTIBULAR ACTIVITY AND HOGYES–BECHTEREW'S PRINCIPLE OF INTERCENTRAL EQUILIBRATION [PARNAIA RABOTA VESTIBULIARNOGO APPARATA (O PRINTSIPE URAVNOVESHENNYKH TSENTROV KHEIGIESA–BEKHTEREVA)].
G. I. Gorgiladze (USSR, Acad. of Sci., A. N. Severtsov Inst. of Animal Morphol., Lab. of Neurobiol., Moscow).
Fiziologicheskii Zhurnal SSSR, vol. 52, Jun. 1966, p. 669–676. 31 refs. In Russian.

Polarization of one labyrinth in cats by direct electrical current of 0.08–0.1 ma caused electrocorticogram changes characteristic of awakening phase: an increase in frequency and a decrease in amplitude. The effect was independent of side and the use of cathode or anode. In several cases the threshold of response to ipsilateral stimulation was lower than to contralateral, and anode threshold was slightly higher than that of cathode. The passage of direct current with cathode on one side and anode on the opposite side, that is, in opposite direction, increased the effect on the electrocorticogram more than after polarization of a single side. During stimulation of both labyrinths by direct current in the same direction, no effect was noted even when stronger current was used (0.5–1 ma). The study of neurons leading to vestibular nuclei showed the reciprocal effect of right and left nuclei: stimulation of one side suppressed the effect on the opposite side. The effect noted in electrocorticograms is the result of balance disturbance of the right and left nuclei.

A66-82193
CHANGES IN ACTIVITY OF VAGAL INSPIRATION NEURONS ON EXPOSURE TO AIR IONIZATION OR TO THE EFFECTS OF PHARMACOLOGIC AGENTS [IZMENENIIA AKTIVNOSTI INSPIRATORNYKH NEIRONOV BLUZHDAIUSHCHIKH NERVOV V USLOVIIAKH IONIZATSII VOZDUKHA I POD DEISTVIEM FARMAKOLOGICHESKIKH PREPARATOV].
V. I. But (USSR, Acad. of Med. Sci., Inst. of Exptl. Med., Div. of Comp. Physiol. and Pathol., Leningrad).
Fiziologicheskii Zhurnal SSSR, vol. 52, Jun. 1966, p. 729–733. 29 refs. In Russian.

Experiments with cats showed that a stream of ionized air and the electric field created around the ionizer affected inspiratory neurons of the vagus nerve by increasing the excitatory state, as seen from an increased discharge number in the electroneurogram. Certain drugs which lower the tonus of bronchial muscles were utilized in order to establish their effect on the inspiratory vagal neurons. Injections of nicotine (0.2 mg./kg.) produced sustained stimulation. Adrenaline (0.2 mg./kg.) and arecoline (0.1 mg./kg.) produced an initial stimulating effect, followed by a decrease in neuron activity. Some drugs which usually increase the tonus of smooth muscles, such as acetylcholine (1 mg./kg.), suppressed the neuron activity. Histamine injected after introduction of atropine (1 mg./kg.) suppressed the neuron activity immediately after the injection with gradual restoration of discharges.

A66-82194
TISSUE ADAPTATION TO CHRONIC HYPOXIA THROUGH GENERATIONS [K VOPROSU O TKANEVOM PRISPOSOBLENII K KHRONICHESKOI GIPOKSII V RIADU POKOLENII].
E. IU. Chenykaeva and G. F. Degtiareva (USSR, Acad. of Sci., I. M. Sechenov Inst. of Evolutionary Physiol. and Biochem., Leningrad).
Fiziologicheskii Zhurnal SSSR, vol. 52, Jun. 1966, p. 741–745. 9 refs. In Russian.

Tissue adaptation to hypoxia through several generations in rats was determined by the degree of activity of succinate-dehydrogenase and cytochrome-c-oxidase in cerebral cortex and medulla. After 13–17 generations the cytochrome-c-oxidase was increased in the medulla, but not in the cerebral cortex. No change was found in the level of succinate-dehydrogenase in any brain tissue studied. The findings indicate that during adaptation to hypoxia some physiological changes occur which can be correlated with changes in complex biochemical processes in tissues due to adaptation. In this case the electron-transfer system is primarily affected, following the primary effect on hemoglobin content and erythrocyte count.

A66-82195
ANALOG COMPUTING DEVICE FOR ANALYSIS OF ELECTROENCEPHALOGRAM [ANALOGOVOE VYCHISLITEL'NOE USTROISTVO DLIA ANALIZA ELEKTROENTSEFALOGRAMM].
E. Ia. Voitinskii and V. A. Prianishnikov (Leningrad Sci.—Res. Inst. of Child Infections, USSR).
Fiziologicheskii Zhurnal SSSR, vol. 52, Jun. 1966, p. 777–780. In Russian.

The authors describe an analog system for automatic continuous computation of a radio of frequency of electroencephalogram to amplitude. A schematic drawing of the unit and mathematical expressions are included. Experimental use indicated an error of less than 5%.

A66-82196
CHANGES OF ASYMMETRY OF EEG WAVES IN DIFFERENT FUNCTIONAL STATES.
E. Ye. Artemieva and E. D. Homskaya (USSR, Moscow U., Lab. of Neuropsychol.).
Neuropsychologia, vol. 4, Jul. 1966, p. 243–251. 14 refs.

Fourteen normal adult subjects in a state of rest revealed rhythmical oscillations of values of ascending and descending fronts of the alpha waves, regular periods being conserved (6–8 and often 7 sec.). The duration of period does not depend on an average level of asymmetry. The periodical oscillations of asymmetry break during the change of functional states such as sleep and arousal as well as during intellectual work (counting, etc.). Then the reaction of depression of alpha rhythm may appear. This phenomenon is related to the unspecifical form of activity which appears in the system of orienting reactions. A break occurs during the first–twelfth presentation of sounds in the periodical oscillations of the asymmetry and a change of its average level. These data disappear during successive stimulations (13th–25th) and appear again when the instruction to count sounds is given. The dynamics of asymmetry of slow electroencephalograph waves are interpreted as a reflection of the activity of the slow regulating system which provides a global control of the levels of activity of the brain.

A66-82197
DUAL FUNCTIONAL ASYMMETRY OF THE BRAIN IN VISUAL PERCEPTION.
Doreen Kimura (McMaster U., Coll. of Health Sci. and St. Joseph's Hosp., Hamilton, Canada).
Neuropsychologia, vol. 4, Jul. 1966, p. 275–285. 25 refs. Grant PHS NB-2831.

Verbal and nonverbal stimuli were presented to normal subjects by means of a tachistoscope. The method employed was that of successive random presentation to either the left or the right visual half-field. Letters were more accurately identified in the right visual field, as previously established, but the enumeration of certain nonalphabetical stimuli was more accurate when they appeared in the left field. It was concluded that the left posterior part of the brain plays an important role in the identification of verbal-conceptual forms, while the corresponding area on the right has other functions in the registration of nonverbal stimuli.

A66-82198
PRESSURE AND SHEARING FORCES AS STIMULI OF LABYRINTHINE EPITHELIUM.
Georg von Bekesy (Harvard U., Cambridge, Mass.).
Archives of Otolaryngology, vol. 84, Aug. 1966, p. 122–130. 11 refs.
NIH and Am. Otol. Soc. supported research.

Since compression forces and shearing forces are interlocked with each other, the question of which produces the stimulus for the receptive organs can be decided only by experiment. Pure mechanical considerations based on comparative anatomy cannot produce a decision between the two possibilities. But it is easy to make a decision when the electrical activities of the end organs are considered. The experiments done on the cochlea of the guinea pig were quite convincing, since it was possible to show that a lateral displacement of the tectorial membrane, resting on top of hair cells, produces more electrical activity than the displacement of the tectorial membrane perpendicular to its surface. Vibratory localization in the organ of Corti for different frequencies is not sufficient to explain the high level of pitch discrimination in hearing, but the interaction between a mechanical localization along the basilar membrane and the nervous inhibitory process together produce the sharpening effects. This nervous sharpening effect can be demonstrated in many other sense organs, as in vision, on the skin, for heat sensations; in all these cases the nervous sharpening seems to be quite effective.

A66-82199
AUTOKINETIC EFFECT AS A FUNCTION OF INTERMITTENCY OF THE LIGHT SOURCE.
Horace A. Page, Lloyd F. Elfner, and Nancy Jamison (Kent State U., Ohio).
Psychological Record, vol. 16, Apr. 1966, p. 189–192. 6 refs.

The latency of the autokinetic illusion was observed as it is related to the rate of intermittency of the stimulus light. Rates of flicker from 2 to 10 c.p.s. were presented. Lowest latency was noted for the 10 c.p.s. condition. The function generated appears remarkably similar to that observed by Spigel (1963) with displacement as a dependent variable. Results are discussed in terms of the phenomenon of brightness enhancement and the effect of flicker on the perceived contour of the stimulus.

A66-82200
DISTAL AND PROXIMAL SIZE UNDER REDUCED AND NON-REDUCED VIEWING CONDITIONS.
Hiroshi Ono (Stanford U., Palo Alto, Calif.).
American Journal of Psychology, vol. 79, Jun. 1966, p. 234–241. 9 refs.

The purpose of the experiment was to investigate whether there was a tendency to judge more readily distal or proximal size under reduced and non-reduced viewing conditions when no specific instructions were given. A task requiring the subject to form his own concept of the stimulus variable was employed. There were four experimental conditions. In the non-reduced-distal (NR-D) condition, subjects viewed the standard with binocular regard and with distance cues. The subject was required to associate the distal size of standard and comparison stimuli. In the non-reduced-proximal (NR-P) condition, the subject viewed the standard stimulus with binocular regard, and his task was to associate the proximal sizes. In the reduced-distal (R-D) condition, the subject viewed the standard stimulus under restricted viewing conditions with monocular regard and his task was the same as in the NR-D condition. In the reduced-proximal (R-P) condition, the viewing condition was the same as in the R-D condition and the subject's task was to associate the proximal sizes. It was found that under the non-reduced condition the subjects learned to associate the distal size more easily than the proximal size. This was thought to be due to the natural tendency of the subjects to respond to the distal size rather than the proximal size under normal unrestricted viewing conditions. Under the reduced conditions, the subjects tended to associate more rapidly the proximal sizes of the standard and comparison stimuli. It is argued that subjects acquired or maintained retinal attitude under reduced conditions.

A66-82201
PERCEPTION OF ORIENTATION: ADAPTATION TO LATERAL BODY-TILT.
Joseph H. McFarland (Antioch Coll., Yellow Springs, Ohio) and Frank Clarkson.
American Journal of Psychology, vol. 79, Jun. 1966, p. 265–271. 14 refs.
Grant NIMH MH-00348.

Subjects were exposed to lateral body-tilts of 20° left, 30° left and right, and 40° left. They rotated a luminous line so that it appeared parallel with the longitudinal axis or so that it appeared to be vertical. Measures were made immediately after tilt and every 7.5 sec. thereafter. After prolonged tilt the apparent body position (ABP) approached the physical body position for all magnitudes and direction of tilt, but the apparent vertical position (AVP) changed direction as a function of magnitude of tilt. After 20° and 30° tilts the AVP moved in the direction of body-tilt, while after 40° tilt the AVP moved opposite to body-tilt. Immediately after tilt there was a maximal deviation in the angular difference between ABP and AVP which varied with the magnitude of tilt, but as tilt was prolonged the difference decreased. It never reached the deviation value before tilt. These effects of prolonged, lateral body-tilt without vision are considered as a type of visual and proprioceptive adaptation to a change in proprioceptive stimulation. The adaptation is not wholly different to that reported in the past.

A66-82202
VISUAL SIZE-CONSTANCY AS A FUNCTION OF DISTANCE FOR TEMPORARILY AND PERMANENTLY MONOCULAR OBSERVERS.
H. W. Leibowitz and R. A. Dato (Pa. State U., University Park).
American Journal of Psychology, vol. 79, Jun. 1966, p. 279–284. 11 refs.
Grant NIMH MH-08061.

An experiment on size-constancy as a function of distance is reported in which the matches made by a relatively large number of permanently monocular subjects were compared with those made by normal subjects viewing monocularly and binocularly. At each distance, the matches made under the three conditions were indistinguishable statistically. The results are consistent with the assumption that size-constancy for distant objects is mediated by learned monocular cues as well as by binocular cues. The discrepancy between these results and those of previous experiments is attributed to the difference in number of monocular cues available to O.

A66-82203
EFFECT OF LIGHT-PERCENTAGE, STIMULUS-LUMINANCE, EXPOSURE-DURATION AND THEIR INTERACTIONS UPON THE CFF THRESHOLD.
Thomas J. Moore (Mass. U., Amherst).
American Journal of Psychology, vol. 79, 1966, p. 291–295. 6 refs.

The interactions of light-percentage (PL), stimulus-luminance (I) and exposure-duration (ED) and their effect on flicker fusion frequency were measured in four groups of eight subjects each. Each group was exposed to an intermediate or high value of I and ED at each of three PL values. Like previously reported results the effects are similar in this study. With an increase I there is a rise in threshold while an increase in PL decreases the threshold. The I $\times$ PL interaction was significant because of a proportionately greater decrease in the threshold at the 90% PL for the lowest illuminance level. The I $\times$ ED interaction was unusual in that the ED of 1.5 sec. in combination with any of the I levels showed no differential effect on the flicker fusion frequency. With a longer exposure time it is thought that the observer could make a better judgment and thus have the same threshold for each of the levels of I.

A66-82204
LOCAL ADAPTATION TO INTERMITTENT LIGHT AS A FUNCTION OF FREQUENCY AND ECCENTRICITY.
Norman Ginsburg (N. Y. State U., Oneonta).
American Journal of Psychology, vol. 79, Jun. 1966, p. 296–300. 13 refs.

Local adaptation is the change in critical flicker frequency due to exposure to an intermittent light. It was measured by subtracting the critical flicker frequency following an adapting stimulus from the score obtained prior to adaptation. Adaptation increased as the adapting stimulus was lowered in frequency to 20 cycles per second below the critical flicker frequency. There was an increase of adaptation toward the periphery, leveling at seven degrees. It was suggested that the effect of frequency on local adaptation probably underlies both the ascending–descending difference in critical flicker

frequency and the influence of the starting point, and that local adaptation depends on cortical cells that mediate the activity of retinal on–off fibers.

A66-82205
FLIGHT SAFETY IN THE NEW JET ERA.
Norbert E. Rowe (Havilland Aircraft of Canada, Ltd., Downsview, Ontario).
Astronautics and Aeronautics, vol. 4, Sep. 1966, p. 84–88. 6 refs.

This article argues for certain steps to promote aviation safety. They can be outlined, in brief, as follows: (1) Two new air-transport accident statistics are needed—namely, "accidents per flight or per sortie" and "fatal accidents per flight"—to replace the usual transportation statistic of accidents per 10^8 passenger miles, which now tends to be misleading as an index of operational safety. (2) With the trend towards increasing aircraft seat capacity, the catastrophic type of accident must be eliminated by: (a) providing aircraft crews with means to obtain precise position in three dimensions at all times, but especially immediately before and during descent from cruising altitude; (b) introducing means for automatic landing as a matter of urgency; and (c) introducing vectored thrust and other means to steepen flight paths in climb and descent and to reduce takeoff and landing speeds. This demands urgent research, development, and design action. (3) Applying the design philosophy of STOL aircraft to medium, and long-range aircraft also, especially the former, with the aim of greatly reducing takeoff and landing speeds. The cost of these safety measures is likely to have a significant effect on operating costs, but prevention of accidents, especially to the very large aircraft now in sight, is of paramount importance, firstly to the ultimate economic health of the air-transportation industry, in terms of its ability to attract customers to the full extent, and secondly to the discharge of its full capacity of service to civilization.

A66-82206
EFFECTS ON FACILITATING, NEUTRAL AND INHIBITING INSTRUCTIONS ON PERCEPTUAL TASKS FOLLOWING BRAIN DAMAGE.
Ann Lodge (Duke U., Durham, N. C.).
(Eastern Psychol. Assn., Meeting, Philadelphia, Apr. 7, 1961).
Acta Psychologica, vol. 25, Aug. 1966, p. 173–198. 38 refs.

The problem of assessment of perceptual experience in brain-injured individuals was examined by comparing their performance with controls on three tasks of differing stimulus character (flicker-fusion, spiral aftereffect, reversible figure) under three different instructional sets (facilitating, neutral, inhibiting). Unstructured, neutral directions differentiated more between brain-injured and controls than did the other two conditions, due to the relatively impaired performance of the brain-damaged subjects. Facilitating, suggestive instructions improved the performance of brain-damaged subjects, while inhibiting instructions, which suggested against the usual perceptual effect, tended to impair the performance of control subjects. The results indicate that inferences concerned with the perceptual functioning of either brain-injured or normal individuals must take instructional conditions into account.

A66-82207
THE SLOW RESPONSE OF THE HUMAN CORTEX TO AUDITORY STIMULI: RECOVERY PROCESS.
Hallowell Davis, Truman Mast, Nobuo Yoshie, and Stanley Zerlin (Central Inst. fot the Deaf, St. Louis, Mo.).
Electroencephalography and Clinical Neurophysiology, vol. 21, Aug. 1966, p. 105–113. 17 refs.
Grant PHS NB-03856.

The late, slow, non-specific diffuse cortical response (the "V potential"), recorded from the vertex relative to mastoid or ear, was studied by the method of averaged responses in waking young adults. Filtered clicks ("tone pips") were the usual stimuli, delivered in repeated cycles of one, two, three, or four similar (or different) tone pips at various intervals within the cycle. The corresponding responses were collected and averaged separately. As a first approximation the latencies do not vary with the audio frequency, the intensity or the interval between the tone pips, although N_2, P_3 and N_3 become small or disappear with short intervals. The latencies may be longer with very weak stimuli near threshold. The amplitude of the V potential is best measured from peak of N_1 to trough of P_2. The amplitude increases slowly with the intensity of the pips. For maximal amplitude the intervals between stimuli must be over 6 sec. and probably at least 10 sec. If the intervals are regular the average amplitude is about 1/2 maximal at 3 sec., 1/4 at 1 sec. and 1/6 at 0.5 sec. If pairs of tone pips are employed the amplitude of the second response depends on the long interval between pairs as well as the short interval between the members of the pair. Variability is considerable from test to test and across subjects but statistically the recovery function is smooth and reproducible.

A66-82208
PSYCHOPHYSIOLOGICAL STUDY ON THE DEPTH OF SLEEP IN NORMAL HUMAN SUBJECTS.
Teruo Okuma, Keisuke Nakamura, Akio Hayashi, and Masamoto Fujimori (Tokyo U., Fac. of Med., Dept. of Psychiat. and Neuropsychiat. Res. Inst., Lab of Neurophysiol., Japan).
Electroencephalography and Clinical Neurophysiology, vol. 21, Aug. 1966, p. 140–147. 12 refs.

In order to study the "depth" of different stages of human nocturnal sleep, electroencephalographic, eye movement, galvanic skin response, and electrocardiographic recordings were made simultaneously with the examination of the responsiveness of the subject to photic stimuli and the measurement of the reaction time. The correction perception and correct motor response were obtained in the trials during stages 1 (awake), 2 (drowsy, suppressed alpha), and in most of the trials in stage 3 (vertex sharp activity). During stage 4 (spindle and K complex) the subject could not perceive the photic stimuli in about 30% of the trials, and correct perception with correct motor response was obtained in less than 30%. During stage 5 (spindle and delta), perception of the photic stimuli was almost impossible. During activated sleep, a correct motor response was obtained in 50% of the trials, and the percentage of correct perception with absent motor response was much higher than in any other stages. There was, in other words, a tendency toward dissociation of the perception and motor responses. The reaction time usually increased as the sleep stage advanced from one to five. The mean reaction time during the activated sleep lay around that of stage 5, and the standard deviation was relatively large. The depth of the activated sleep determined by both the stimulus-response experiment and the measurement of the reaction time is assumed to be around that of stage 4. The mode of perception and motor response during the activated sleep, however, seems to be different from those of the other sleep stages not only quantitatively but also qualitatively.

A66-82209
THALAMO-CORTICAL ACTIVITY DURING INCREASED GRAVITATIONAL STRESS.
A. N. Nicholson (Roy. AF Inst. of Aviation Med., Farnborough, Great Britain).
Electroencephalography and Clinical Neurophysiology, vol. 21, Aug. 1966, p. 168–179. 38 refs.

Cortical responses of cats evoked by afferent stimulation of the visual pathway were observed during increased gravitational stress simulated by a centrifuge. An enhancement of the responses was observed during positive (long axis) acceleration and was related to the magnitude and duration of the linear acceleration. It was not induced by angular accelerations and did not occur during lateral acceleration. It is concluded that the hypotension induced by positive acceleration is essential to the changes in thalamo-cortical excitability. The phenomenon arises from reduced cerebral blood flow, but the central effect of carotid receptor activity may be involved. The effects are unlikely to be mediated by the reticular formation but probably arise from changes in cellular excitability induced directly at thalamic and cortical levels. It is suggested that in the conscious animal the increased sensory inflow of gravitational stress may also modify thalamo-cortical excitability, and under these circumstances the effects of increased gravitational stress may modify both reticular and forebrain mechanisms.

A66-82210
A STUDY ON THE CUTANEOUS PRICKING PAIN THRESHOLD IN NORMAL MAN.

M. Della Corte, P. Procacci, G. Bozza, and G. Buzzelli (Consiglio Nazl. delle Ric., Impresa Elettrofisiol., Firenze, U., Ist. di Fisiol. umana, Ist. di Fisica, and Ist. di Patol. Speciale Med. e Metodol. Clin. (II), Italy).

Achivio di Fisiologia, vol. 64, Dec. 15, 1965, p. 141–170. 68 refs. In Italian.

An account of the methods suitable for the study of the cutaneous pain threshold is presented, considering particularly those based on thermal stimulation, which are the best suited for this kind of determination. The thermal algometer used in the research is described. The method for the determination of the pricking-pain threshold is different from those normally adopted; the threshold energy is in fact obtained from the analysis of the whole stimulus intensity-threshold time curve. Threshold energy is determined in 200 young subjects of both sexes. A mathematical analysis and a statistical treatment of experimental data are carried out. The fundamental results are the following: (1) a systematic difference between the threshold energy value determined in the right forearm and in the left is found, but this remains within the limits of experimental errors; (2) a systematic difference, statistically significant, between the threshold energy value in men and in women is observed: threshold energy is lower in women; and (3) in women, variations of threshold energy during the menstrual cycle are presented including, (i) a small increase from the beginning to the end of the cycle, which however remains within the limits of experimental error; and (ii) a remarkable temporary increase statistically significant, halfway through the cycle.

A66-82211
IMPEDANCE PNEUMOGRAPHY [LA PNEUMOGRAFIA AD IMPEDENZA].

R. Nencini and E. Pasquali (Consiglio Nazl. Ric., Ist. Nazl. di Psicol., Rome, Italy).

Archivio di Fisiologia, vol. 64, Dec. 1965, p. 171–188. 15 refs. In Italian.

A review is presented of the passive electrical characteristics of living tissues with particular reference to those of the lung and to their changes during respiration. Some of the techniques for detecting these changes are described. Details are given of a transistorized device of such conception that the information relative to electrical impedance changes during respiration can be directly recorded on any electrocardiogram or electroencephalogram apparatus or on common magnetic tape recorders. Examples of impedance pneumographs obtained with this device are reported in comparison with recordings of respiration obtained by other methods.

A66-82212
AUDIOMETRIC INVESTIGATIONS OF HEARING IN WORKERS OF NOISY-DEPARTMENTS OF THE KRASNODAR PLANT "TRAKTORSELK'HOZZAPCHAST" [AUDIOMETRICHESKOE ISSLEDOVANIE SLUKHA U RABOCHIKH SHUMNYKH TSEKHOV KRASNODARSKOGO ZAVODA "TRAKTORSEL' KHOZZAPCHAST"].

E. A. Mel'nikova (Kuban Med. Inst., Krasnodar, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, vol. 7, Jun. 1966, p. 34–38. 6 refs. In Russian.

The high-frequency intensive noise in inspected departments exerted an adverse effect on hearing, causing fatigue and reducing its acuity. Many workers with a service record of 1 year showed reduced auditory acuity, as compared with persons with service records from 5 to 10 years. A greater sensitivity of the auditory organ was found in workers with a short service record. In order to prevent the development of occupational hearing disorders it is necessary, in addition to technical measures, to screen workers by setting up special tests for persons particularly susceptible to noise. This will not only contribute to the preservation of health, but also reduce the worker turnover in noise-ridden industries.

A66-82213
RADIATION PROTECTION DURING FLIGHTS OF SPACECRAFTS "VOSKHOD" AND "VOSKHOD-2" [OBESPECHENIE RADIATSIONNOI BEZOPASNOSTI PRI POLETAKH KORABLEI "VOSKHOD" I "VOSKHOD-2"].

Iu. M. Volynkin, V. V. Antipov, B. I. Davydov, N. N. Dobrov, M. D. Nikitin, N. F. Pisarenko, and P. P. Saksonov.

Kosmicheskie Issledovaniia, vol. 4, Jul.–Aug. 1966, p. 630–633. 6 refs. In Russian.

Prior to space flights of Voskhod I and Voskhod 2 the amount of cosmic radiation to which each member of the crew would be exposed was theoretically computed to be not more than a fraction of the biological-equivalent-roentgen dose for 24 hrs. During the flights of Voskhod 1 and Voskhod 2 the cosmonauts were equipped with miniature devices for recording various types of ionizing radiation, which could function under conditions of near vacuum, and were placed over the chest under the space suit and in the outside hip pockets. The total radiation dose received by each cosmonaut during Voskhod 1 flight was equal to 30 ± 5 mrad; and during Voskhod 2, 70 ± 5 mrad. Theoretical consideration had indicated that the cosmonaut who stepped into space during the extravehicular activity would be exposed to a large dose of soft electron radiation. However, the actual dose was equal to that of the cosmonaut-pilot. Tests of the nuclear emulsions showed the presence of particles with linear loss of energy equal to that of helium, boron, oxygen, and argon ions.

A66-82214
BIOLOGICAL EXPERIMENTS CONDUCTED ON THE SOVIET SPACECRAFTS "VOSKHOD" AND "VOSKHOD-2" [BIOLOGICHESKIE ISSLEDOVANIIA NA KOSMICHESKIKH KORABLIAKH "VOSKHOD" I "VOSKHOD-2"].

N. N. Zhukov-Verezhnikov, I. N. Maiskii, N. L. Delone, N. I. Rybakov, V. A. Kozlov, B. I. Davydov, V. V. Antipov, P. P. Saksonov, K. D. Rybakova, and G. P. Tribulev.

Kosmicheskie Issledovaniia, vol. 4, Jul.–Aug. 1966, p. 634–640. 15 refs. In Russian.

The effects of space flight and cosmic radiation, as well as the radioprotective effect of beta-mercaptopropylamine, were measured in lysogenic bacteria, *Escherichia coli* K-12 ( ) placed on board the spacecrafts Voskhod 1 and 2. Several tubes were taken out into space during extravehicular activity. Bacterial samples after the Voskhod 2 flight showed a slight increase in the number of viable cells over the control cultures which remained in the laboratory at the launching site. No change was noted in the number of phage induced by X-rays, chromosomal aberrations, or auxotrophic mutations between exposed and control cultures. No effect of the radiation protector was noted. No effect of space flight factors was noted in mitosis of pine and wheat seeds.

A66-82215
RETROGRADE AMNESIA INDUCED BY CARBON DIOXIDE INHALATION.
Elton E. Quinton (Calif. U., Los Angeles).
Psychonomic Science, vol. 5, Aug. 15, 1966, p. 417–418. 6 refs.
Grant PHS 5-TI-MH-6666.

Rats were administered either air, 30% CO_2 or 50% CO_2 for 2 min., 7 min., or 15 min. immediately following completion of a "one-trial" conditioning procedure. It was found upon testing 24 hr. later that both concentrations of CO_2 produced retrograde amnesia, and that 50% CO_2 had a greater amnesic effect than did 30% CO_2. Increasing the duration of administration increased the degree of amnesia only in the groups receiving 30% CO_2.

A66-82216
EFFECTS OF DINITROPHENOL ON COCHLEAR POTENTIALS OF THE CAT. I. NORMAL EAR.
Alfred H. Chambers and George G. Lucchina (Vt. U., Coll. of Med., Dept. of Physiol. and Biophys., Burlington).
Journal of Auditory Research, vol. 6, Jan. 1966, p. 13–21. 9 refs.
Grants PHS BN-04143, BPD-8249C1, and 1-F10-NB-1363.

Cochlear potentials elicited by a 2 kc.p.s. tone were recorded from the anesthetized but otherwise normal cat. The effect on these potentials of 2, 4-dinitrophenol (DNP) was observed. DNP administered both intravenously and by direct application to the round window decreased these potentials, the latter route causing greater decrease than the former. Some possible explanations of these observations are discussed.

A66-82217
EFFECTS OF DINITROPHENOL ON COCHLEAR POTENTIALS OF THE CAT. II. ACOUSTICALLY INJURED EAR.
George G. Lucchina and Alfred H. Chambers (Vt. U., Coll. of Med., Dept. of Physiol. and Biophys., Burlington).
Journal of Auditory Research, vol. 6, Jan. 1966, p. 23–30.
Grants PHS NB-04143, BPD-8249C1, and 1-F10-NB-1363.

Acoustic injury by a prolonged high-intensity 2 kc.p.s. tone was inflicted on the ear of the anesthetized cat while cochlear potentials were being recorded. Following this injury the effect of 2,4-dinitrophenon (DNP) on the cochlear potentials elicited by 2 kc.p.s. test tones of both low and high intensity was observed. Intravenous DNP was followed by increase of these potentials when the test tone was of low intensity but by decrease when the test tone was of high intensity. DNP applied to the round window was followed by decrease in the potentials when the test tone was of low intensity. Some possible explanations of these observations are discussed.

A66-82218
COMPARATIVE INTELLIGIBILITY SCORES OF SENTENCE LISTS AND CONTINUOUS DISCOURSE.
Thomas G. Giolas (Ala. U., University).
Journal of Auditory Research, vol. 6, Jan. 1966, p. 31–38. 10 refs. Ala. U. supported research.

This study investigated the relationship between sentences developed at The Central Institute for the Deaf (C.I.D.) designed to measure auditory discrimination ability, and a sample of continuous discourse consisting of a 15-min. lecture shown through a phonetic analysis to be a good representation of everyday conversational speech. Speech samples were recorded on magnetic tape under seven low-pass filtering conditions. Normal-hearing college students were divided into seven groups of 20 each, each group listening to all speech samples under one particular condition of filtering. Sentence lists were examined for number of key words correct, and the continuous discourse for items correct on a test covering information presented in the lecture. For both sentences and continuous discourse, errors increased in the same way as frequency distortion increased. The error curves for the two sentence lists used lie closer to the curve for continuous discourse than do the curves for either the PB-50 or the W-22 Monosyllabic Word Lists as compared in a previous study. Therefore, the possibility is opened of employing the C.I.D. Sentence Lists for estimating a patient's ability to hear and understand colloquial speech.

A66-82219
STUDIES ON THE RELIABILITY OF AUDITORY THRESHOLD VALUES.
S. Hickling (Otago U., Med. School, New Zealand).
Journal of Auditory Research, vol. 6, Jan. 1966, p. 39–46. 10 refs.

Two experiments were designed to investigate certain aspects of audiometric reliability based on the average intra-subject standard deviation from the mean of three successive threshold values obtained from sixty subjects at 1, 2, 6 and 8 kc.p.s. test tones. Comparison of the results obtained when the earphones were removed and replaced on the ears between each test and when they were left in place between tests suggests that the difference in reliability commonly found between the middle frequencies and the high frequencies is due entirely to the effect of altered earphone placement on standing wave formation. Also demonstrated by the experimental results were the equal reliability of response of the left and right ears, improvement of reliability with immediate listening practice, and improvement in reliability as the interval between successive tests was reduced.

A66-82220
AMPLITUDE CHANGES OF EVOKED POTENTIALS IN THE AUDITORY SYSTEM OF UNANESTHETIZED CATS DURING ACOUSTIC HABITUATION.
C. W. Dunlop, W. R. Webster, and R. S. Rodger (Sydney U., New South Wales, Australia).
Journal of Auditory Research, vol. 6, Jan. 1966, p. 47–66. 18 refs. Natl. Health and Med. Res. Council, Australia and Sydney U. supported research.

Habituation of responses was observed at the cochlear nucleus, inferior colliculus, and medial geniculate body of unanesthetized cats. There appeared to be no statistically significant relationship with stimulus intensity at the inferior colliculus and cochlear nucleus, but there was a direct relationship at the medial geniculate body. In the three auditory regions studied there occurred an early rapid decline in the mean amplitude of evoked responses to repetitive stimulation.

At the cochlear nucleus level and to a lesser degree, the inferior colliculus level, the amount of habituation was asymptotic within 20 minutes. Medial geniculate body responses, however, tended to steadily decline in amplitude over the test period.

A66-82221
BINAURAL PITCH-MATCHING WITH CONTINUOUS TONES.
Kenneth Berger (Kent State U., Ohio).
Journal of Auditory Research, vol. 6, Jan. 1966, p. 87–90. 6 refs.

Ten young adults with normal hearing made 40 diotic pitch matches between a continuous 1-kc. tone in one ear and a continuous variable-frequency tone in the other, both at 40 db. sensation level. Test ear and initial placement of variable tone were irrelevant. Mean pitch error, disregarding sign, was 18.8 ± 9.5 c.p.s. which forms a tentative norm for clinical studies of diplacusis. Individual standard errors of matches ranged from 2.2 30.6, median 15.3 c.p.s., which defines the region within which binaural fusion exists under our stimulus conditions. Some practice but no fatigue effects were found with a preliminary subject of whom 100 judgments were required.

A66-82222
NORMAL WIDTH IN TRACING ON BEKESY AUDIOGRAM.
Tokuro Suzuki and Katsura Kubota (Shinshu U., Fac. of Med., Dept. of Otolaryngol, Matsumoto, Japan).
Journal of Auditory Research, vol. 6, Jan. 1966, p. 91–96. 13 refs.

Bekesy tracing widths on 50 normal-hearing subjects, ranging in age from 20–30 years, were obtained with continuous and interrupted tones in an effort to establish normative data. The average widths of both tracings for pure tones of five fixed frequencies from 0.5–8 kc.p.s. were measured. The normal limits for the relation between both average widths for each of the frequencies tested was calculated and charted on a graph. When this relation was taken into account, an abnormal width in the Bekesy tracing was found even in some ears with sensorineural involvements whose average width in the tracings with continuous tones had heretofore been considered within normal limits.

A66-82223
WORD DISCRIMINATION IN CATS.
Dickens Warfield, Robert J. Ruben, and Robert Glackin (Johns Hopkins U., School of Med., Div. of Otolaryngol., Baltimore, Md.).
Journal of Auditory Research, vol. 6, Jan. 1966, p. 97–119. 14 refs.
Natl. Inst. of Neurol. Diseases and Blindness and Alfred P. Sloan Found. supported research.

Ten unilaterally labyrinthectomized cats were trained using a food reinforcer to discriminate between the taped spoken words "cat" and "bat". Pure tone thresholds were measured on six animals for frequencies of 0.5 to 8 kc.p.s. The effect of removing initial segments of each word was studied. The effect of removing initial segments of each word was studied. Correct responses to "cat" fell below 75% when an initial 50 msec. was removed. The comparable figure for "bat" was 43.5 msec. These results were similar to those obtained with ten human listeners. The animals were tested with 21 words, each presented once, which differed from the training pair in initial consonant, final consonant, middle vowel, or all three aspects. The animals were subjected to broadband noise for varying periods of time and were retested for discrimination of the intact words, for "chopped" words, and for sensitivity to pure tones. Cochlear microphonics were measured, and cochlear reconstructions were made from microscopic sections. Four animals were able to discriminate the intact words following noise exposure, and their reactions to chopped words showed no systematic changes. The cochlear microphonics of these cats showed good sensitivity and large maxima, or overload points for most frequencies. These cochleas were essentially normal anatomically. Three animals could not discriminate the words, and responses to tones with high thresholds. The sensitivity of their cochlear microphonics was poor, with few and very small maxima. Anatomically their cochleas displayed large areas of damage, with a few normal outer hair cells in the base and/or apex. Normal inner hair cells were more numerous than normal outer hair cells.

A66-82224
THE THRESHOLD OF THE RETINA TO DAMAGE BY LASER ENERGY.
Charles J. Campbell, M. Catherine Rittler, Kimiharu S. Noyori (Columbia U., Coll. of Physicians and Surgeons, Presbyterian Hosp., New York City, N. Y.), C. Hermas Swope, and Charles J. Koester (Am. Opt. Co., Res. Div., Southbridge, Mass.).
Archives of Ophthalmology, vol. 76, Sep. 1966, p 437–442. 6 refs.

Characteristic retinal lesions produced by a ruby laser at near threshold energy values were gray, disc shaped, and often difficult to detect. They were similar in appearance in both rabbit and human subjects. The energy values necessary to produce a threshold lesion were significantly lower in rabbits than in human subjects, and in one human subject the threshold was lower in the macula than in other areas of the retina. In rabbits the energy density value of a threshold lesion, immediately after treatment, was not in significant disagreement with previously published values. Finally, the lowest thresholds for both rabbits and humans were found to be 24 to 48 hours after exposure.

A66-82225
EFFECTS OF ENVIRONMENT ON RESPIRATORY FUNCTION.
Michael J. Spodnik, Jr., Georgia D. Cushman, David H. Kerr, Richard W. Blide, and William S. Spicer (Md. U., School of Med., Div. of Pulmonary Diseases, Baltimore).
Archives of Environmental Health, vol. 13, Aug. 1966, p. 243–254. 13 refs.
Grant PHS AP00045.

One hundred young white male college students were divided at random into seven groups for evaluation of respiratory function using the whole body pressure plethysmograph. A different group was studied on each Thursday afternoon, in rotation, during the period of October 22 through May 27. Variation in group mean respiratory function occurred which resembled a single cycle with poorest function in February–March. The subjects within groups underwent parallel changes in function. After correction of intergroup differences, these respiratory function changes correlated significantly and best with temperature outside on the day of measurement. Airway resistance increased as temperature decreased. Subjects with a history of asthma, but presently asymptomatic, had significantly abnormal respiratory function in comparison to their normal classmates and responded differently to temperature change.

A66-82226
THE EFFECT OF ADRENALINE ON LIPOLYSIS AND GLYCOGENOLYSIS IN RELATION TO AGE AND STRESS.
E. Stuchlikova, J. Hruskova, Z. Hruza, M. Jelinkova, P. Novak, and K. Soukupova (Czechoslovak Acad. of Sci., Inst. of Physiol., Lab. of Exptl. Gerontol., Charles' U. Hosp., IVth Med. Clin. and Inst. of Aviation Med., Prague).
Experimental Gerontology, vol. 2, Aug. 1966, p. 15–21. 32 refs.

After the administration of 0.4 mg. adrenaline subcutaneously, the non-esterified fatty acid, glucose, pyruvic acid, and citric acid levels of the blood were investigated. Middle-aged persons adapted to stress, pilots of supersonic planes, and old people with atherosclerosis were investigated. The results were compared with results in a control group of clinically healthy young individuals. Higher non-esterified fatty acid values were found in the group of persons adapted to stress and in the old group even before the adrenaline application. Their response to adrenaline was decreased. In the other values there was no marked difference.

A66-82227
THE EFFECT OF COOLING ON THE SPEED OF AGEING OF COLLAGEN IN VITRO AND IN HIBERNATION OF THE FAT DORMOUSE (GLIS GLIS).
Z. Hruza, Z. Zrzalova, V. Hlavackova, and Z. Hrabalova (Czechoslovak Acad. of Sci., Inst. of Physiol., Lab. of Exptl. Gerontol., Prague).
Experimental Gerontology, vol. 2, Aug. 1966, p. 29–35.

Chemical contraction and relaxation in sodium perchlorate were measured in fibers of rat tail tendons either left in the animal or put into the refrigerator (0°C.) in dry state. The contraction and relaxation of the refrigerated fibers did not change during 4.5 months of the experimental period in spite of the fact that the control fibers in the animals aged considerably. Hibernating animals, fat dormice (*Glis glis*) were left for three months in the refrigerator at 5°C. where they hibernated most of the time at a body temperature of 6°–12°C. The control group was left at room temperature (22°C.). The ageing of the collagen fibers from the tails of the hibernating animals as measured by chemical contraction and relaxation was slowed down to a great extent or stopped altogether, depending on the depth of hibernation. Cooling, therefore, slows down or stops the ageing of connective tissue in vivo and in vitro.

A66-82228
SPONTANEOUS ELECTRODERMAL ACTIVITY DURING WAKING AND SLEEPING.
Laverne C. Johnson and Ardie Lubin (U.S. Navy Med. Neuropsychiat. Res. Unit, San Diego and San Diego State Coll., Calif.).
Psychophysiology, vol. 3, Jul. 1966, p. 8–17. 19 refs.
Grants NSF GB-922 and GB-3961 and U.S. Navy supported research.

Spontaneous electrodermal activity (EDA) (galvanic skin response (GSR) and skin potential response (SPR)) was recorded during daytime sleep and nighttime sleep. During all sleep, spontaneous EDA occurred most frequently during stages three and four (slow wave sleep) and least frequently during stage one (rapid eye movement (REM) and non-REM). This pattern was consistent over three nights of sleep. There was no relation between waking and sleeping spontaneous EDA. The spontaneous EDA during slow wave sleep significantly exceeded that during waking. During sleep, spontaneous SPRs often occurred without spontaneous GSRs.

A66-82229
INDIVIDUAL AND INTERINDIVIDUAL DIFFERENCES IN BINOCULAR RETINAL RIVALRY IN MAN.
Marlene Aafjes, Johan E. Hueting, and Piet Visser (Amsterdam U., Physiol. Lab., Div. of Psychophysiol., The Netherlands).
Psychophysiology, vol. 3, Jul. 1966, p. 18–22. 14 refs.

In a group of 12 male and female subjects of ages between 18 and 45 years the alternation frequency of binocular retinal rivalry (BRR) changed, depending upon the durations of the periods for which the target was fixated, and of the intercalated resting time. Analysis of variance indicated significant interindividual differences in level of mean frequency and in rate of increase.

A66-82230
THE EFFECTS OF EPINEPHRINE AND NOREPINEPHRINE ON AN ASPECT OF COLOR VISION.
Martin H. Keeler and Edward F. Doehne (N. C. U., School of Med., Dept. of Psychiat., Chapel Hill).
Psychophysiology, vol. 3, Jul. 1966, p. 35–39.

With a test involving image and after-image relation, it is demonstrated that epinephrine differentially affects reactivity to green (530 m) and red (625 m) stimuli and that most of the response is accounted for by altered response to the green stimulus. Norepinephrine effect was in the same direction but not statistically significant and might be accounted for by endogenous epinephrine secretion.

A66-82231
HEART RATE FLUCTUATIONS AND FIXED FOREPERIOD REACTION TIME.
William J. Meyers (Iowa U., Inst. of Child Behavior and Develop., Iowa City).
Psychophysiology, vol. 3, Jul. 1966, p. 40–45. 9 refs.
Grant PHS MF-8687 and John and Beatrice Lacey supported research.

Visual reaction times were recorded in a fixed foreperiod situation to study the relation between sensorimotor performance and heart rate measures. With 42 male college students as subjects, both resting and performance levels of heart rate and heart rate fluctuations were obtained. Reaction time data were collected from blocks of trials at given foreperiods which ranged from one to nine sec. Three groups of subjects, formed on the basis of high, medium, and low levels of peaktrough differences in heart rate during the reaction-time trials, showed different foreperiod functions. The hypothesis that fluctuations in heart rate are related to fixed foreperiod reaction time performance was supported.

A66-82232
THE EVOKED HEART RATE RESPONSE DURING SLEEP.
David J. Hord, Ardie Lubin, and Laverne C. Johnson (U. S. Navy Med. Neuropsychiat. Res. Unit, San Diego and San Diego State Coll., Calif.).
Psychophysiology, vol. 3, Jul. 1966, p. 46–54. 18 refs.
Grants NSF GB-922 and GB-3961 and U. S. Navy supported research.

Heart rate (HR) responses evoked by a 3-sec. auditory stimulus were averaged within stages of sleep for five subjects. Although there were some individual differences, the evoked HR response is generally diphasic, with the peak of the acceleratory component occurring on the fourth post-stimulus beat and the trough of the deceleratory component occurring on the 10th post-stimulus beat. Unlike other vari-

ables, which are depressed during the rapid eye movement (REM) stage, the HR response tends to be larger during the REM stage than during other stages of sleep. The size of the response is not appreciably affected by time of night, since HR is non-habituating during sleep, but is affected by the respiratory cycle phase, being largest when the stimulus occurs during inspiration or the period immediately prior to inspiration, and smallest when the stimulus occurs during the expiratory phase.

A66-82233
THE AVERAGED EVOKED CORTICAL RESPONSE TO COMPLEX VISUAL STIMULI.
Kenneth Lifshitz (Rockland State Hosp., Res. Center, Orangeburg, N. Y.).
Psychophysiology, vol. 3, Jul. 1966, p. 55–68. 15 refs.
Grant NIH MH 07292.

Averaged cortical evoked responses in man to repetitive informationally complex pictorial stimuli, as opposed to other visual stimulation, were obtained from scalp electroencephalographic (EEG) recordings. The method used involved the projection of lantern slides. Included were three different categories (indifferent scenic, repulsive medical, and nude female photographs) assumed to evoke, respectively, neutral, negative, and positive reactions in the normal young male subjects. In all subjects, recordings from occipital or occipitoparietal scalp leads consistently resulted in evoked response patterns to pictorial slides measurably differing from responses to these same slides made non-associational through defocusing, or to blank light flashes. Responses to pictorial stimuli were also different than those to motivated observation of projected words, colors, or geometric patterns. The evoked response to the three different categories of pictorial stimuli also showed significant differences. These differences were not as marked and were clearly replicable only for some subjects.

A66-82234
ORIENTING AND ADAPTIVE CARDIOVASCULAR RESPONSES TO HEAT AND COLD.
George H. Zimny and Frank L. Miller (St. Louis U., School of Med., Dept. of Psychiat., Mo.).
(Soc. for Psychophysiol. Res., Meeting, Houston, 1965).
Psychophysiology, vol. 3, Jul. 1966, p. 81–92. 12 refs.
Grant PHS MH-5973-12.

Nine hypotheses derived from the theory of E. N. Sokolov (1963) were tested. The hypotheses dealt with the habituation and return of the orienting and adaptive responses. Three presentations of an auditory stimulus were interpolated among a series of 28 presentations of a cold stimulus administered to one group of 13 human subjects and among 28 presentations of a hot stimulus administered to another group of 13 subjects. Heart rate and amplitude and latency of vasomotor response to all stimuli were measured using a finger photoplethysmograph. When vasoconstrictive orienting responses to hot and to cold habituated out, vasoconstrictive adaptive responses to cold and vasodilatory adaptive responses to heat appeared. Eight of the nine hypotheses were confirmed, thereby providing strong support for Sokolov's theory, upon which the hypotheses were based.

A66-82235
A METHOD FOR APPLYING STATISTICAL DECISION THEORY TO SYSTEM TASK ANALYSIS.
Alvin S. Cooperband and Lawrence T. Alexander (System Develop. Corp., Santa Monica, Calif.).
(APA Conv., Chicago, Ill., Sep. 1965).
Human Factors, vol. 7, Dec. 1965, p. 507–511.

For system tasks involving signal detection, a method is presented by which statistical decision theory may be used to derive limiting conditions for adequate operator performance from results obtained in an abstracted laboratory task. The limiting conditions may then serve as a basis for making design decisions regarding functions allocation and for specifying operating rules. The method is illustrated with a collision-prediction task in which previous research suggests that performance depends on the ability to detect a non-zero rate of change in the relative bearing between the two objects moving on converging paths.

A66-82236
THE EFFECTS OF AMOUNT OF INFORMATION PROVIDED AND FEEDBACK OF RESULTS ON DECISION MAKING FREQUENCY.
Charles H. Hammer (U.S. Inform. Agency, Washington, D. C.) and Seymour Ringel (U.S. Army Personnel Res. Office, Washington, D. C.).
Human Factors, vol. 7, Dec. 1965, p. 513–519.

Sixty subjects worked a series of sequential decision making tasks in which the amount of information provided and feedback of results were the independent variables. Data were collected on decision accuracy, confidence in decision accuracy and judged sufficiency of the information provided. Accuracy, confidence in accuracy, and ratings of sufficiency increased as amount of information provided was increased. Feedback produced increases in decision accuracy only. For 40% of all correct responses, subjects judged the information provided to be insufficient as a basis for taking action. These data strongly suggest that lack of confidence in their ability to make accurate decisions may cause some decision makers to delay taking action even when they are able to make an accurate decision on the basis of the information available.

A66-82237
BRIGHTNESS CONTRAST, COLOR CONTRAST, and LEGIBILITY.
Michael V. McLean (North Am. Aviation, Space and Inform. Systems Div., Los Angeles, Calif.).
Human Factors, vol. 7, Dec. 1965, p. 521–526. 16 refs.

An experimental study was conducted to investigate the effects of color and brightness contrast, direction of contrast, and six contrast values upon the legibility of a circular dial. The brightness of four chromatic hues was matched with four achromatic hues. Hues were combined in all possible combinations excluding chromatic with achromatic, resulting in six contrast values. For both dark on light and light on dark contrast directions, the contrast values were equal. Half of the twenty-four subjects had pilot training and half did not. A Dodge type tachistoscope was used to present the stimulus conditions. Reading time results indicated that the addition of color contrast to a dial of a given achromatic brightness contrast value, with a light on dark contrast direction, will not degrade and may improve the legibility of that dial. Legibility was also found to increase as contrast value increased. The study indicates that the use of color should be reconsidered in its application as a coding technique in complex system displays.

A66-82238
SEARCH PERFORMANCE AS A FUNCTION OF PERIPHERAL ACUITY.
Dorothy M. Johnston (Boeing Co., Seattle, Wash.).
Human Factors, vol. 7, Dec. 1965, p. 527–535. 14 refs.

This study was made to investigate the relationship between the size of visual fields of observers and time required to locate targets on statistic displays. The findings, which indicate that people with large visual fields can find targets more rapidly than observers with small fields, have practical selection and training application. Equations are presented which can be used to determine search time that can be expected as a function of the size of the visual field of the observer and the apparent size of the area being searched.

A66-82239
OPERATIONAL CONCEPT ANALYSIS AND SOURCES OF FIELD DATA.
Martin I. Kurke (Tech. Operations, Inc., Fort Belvoir, Va.).
Human Factors, vol. 7, Dec. 1965, p. 537–544.

Human factors scientists often work closely with operations analysts in the investigation of social, business and man–machine systems within viable operational organizations. The human factors approach to such operational concept studies should be commensurate with that of the operations research worker. One approach to such methodology is described in this paper as is a description of field data sources available to the Army.

A66-82240
LEGIBILITY STUDY OF SELECTED SCALE CHARACTERISTICS FOR MOVING-TAPE INSTRUMENTS.
Barbara J. Kelso (Bunker-Ramo Corp., Canoga Park, Calif.).
Human Factors, vol. 7, Dec. 1965, p. 545–554. 20 refs.
Contracts AF 33(657)-8600 and AF 33(657)-8021.

A legibility study was performed to investigate the effects of scale factors, graduation marks, orientation of scales, and reading conditions on the speed and accuracy of reading moving-tape instruments. Each of 150 Air Force Officers made 150 self-paced readings from slides of hand drawn tape instruments. Error was expressed as the magnitude of deviation of a subject's verbal response from the set scale value. An analysis of variance was performed on the mean error scores, standard deviations of error, mean reaction times, and standard deviations of reaction times. The results clearly favored the 1-7/8 inch scale factor over the 1-3/8 inch and the 2-3/8 scale factor. The use of nine graduation marks was superior to either 0, 1, 3, or 4 graduation marks. Reading conditions had little effect on performance. Horizontal scales were read more rapidly but no more accurately than vertical scales.

A66-82241
DYNAMIC VISION: THE LEGIBILITY OF MODERATELY SPACED ALPHANUMERIC SYMBOLS.
S. Lippert and D. M. Lee (Douglas Aircraft Co., Inc., Biotechnol. Sect., Long Beach, Calif.).
Human Factors, vol. 7, Dec. 1965, p. 555–560.

Two experiments were conducted to investigate subject performance on the basis of two criteria, zero and 100% legibility of moving targets. A modified method of limits was employed. The targets consisted of black alphanumeric symbols regularly spaced 7.5 degrees apart on a brightly illuminated white background. Each target subtended an angle of 39 min. Legibility of the symbols was determined as they moved vertically from top to bottom in a frontal plane. The mean angular velocities for both the zero and 100% legibility performance levels were found to be approximately three times higher for the 7.5 degree symbol spacing than their respective velocities for a previously determined 1.5 degree symbol spacing. Performance was approximately twice as good with a 30 degree aperture as with a 3 degree aperture.

A66-82242
EFFECTS OF MAGNIFICATION AND OBSERVATION TIME ON TARGET IDENTIFICATION IN SIMULATED ORBITAL RECONNAISSANCE.
Charles W. Simon and David W. Craig (Hughes Aircraft Co., Newport Beach, Calif.).
Human Factors, vol. 7, Dec. 1965, p. 569–583. 8 refs.

When deciding what telescopic power is required to find objects of interest on the ground while flying over the earth at relatively high speeds, the positive value of an increased magnification must be balanced against the negative effects of a decreased observation time and an increased movement rate. The relative trade-off between magnification and time was compared in a series of three studies in which photographic imagery was used to simulate a telescopic view of the earth from a spacecraft orbiting at 175 nautical miles. Target acquisition decreased as image scale factor decreased and as image movement rate increased. When a change in scale factor was inversely proportional to a change in observation time, the positive effects of an increased image scale factor tended to exceed the negative effects of a decreased observation time and increased image movement rate within the limits of this study. The theoretical and practical implications of these and other results are discussed.

A66-82243
A SYSTEMS TASK USED IN THE STRESS TESTING OF SPECIAL MISSION PERSONNEL.
Richard E. McKenzie (USAF School of Aerospace Med., Brooks AFB, Tex.).
Human Factors, vol. 7, Dec. 1965, p. 585–590.

One aspect of a psychologic evaluation program for special mission personnel was structured within a concept of competing tasks, requiring two operator signal-display sources. One source produced an array of discrete, discontinuous signals. The other produced a continuous input for the operator to monitor and process. The evaluation was made with reference to the performance of an "ideal" subject. The results indicate that a criterion group of those finally selected for the special mission was better able to adapt to the two competing tasks and was less susceptible to the signal/noise ambiguity and the induced task stress than the special mission personnel group as a whole.

A66-82244
EFFECT OF ILLUMINATION ON DISTANCE ESTIMATION [PUSOBENI SVETELNYCH PODMINEK NA ZACVIK V ODHADU VZDALENOSTI].
R. Miksl.
Ceskoslovenska Hygiena, vol. 11, Jul. 1966, p. 353–359. 11 refs. In Czech.

Male subjects were exposed to different illumination intensity levels in order to determine distance estimation train-

ing with the Müller–Lyer visual illusion. Two groups of subjects were trained at artificial illumination (bulb point source, direct illumination, illumination intensity 30 Lx) on both glossy and dull paper strips, where the picture of the illusion was drawn. The third group of twenty persons worked at day illumination (400–700 Lx) with the dull paper. The best results, that is, the least frequency of mistakes in distance estimation during the training, were obtained by the group working at day illumination, the worst results by the group working at artificial illumination with the dull paper strips. Unexpected results were reached by the group working with the glossy paper strips at artificial illumination. These results were better than those on the dull paper strips, other conditions being equal. As the described work is monotonous, it is concluded that the suppression from both the inactivity and monotonous activity can be compensated by bringing the central nervous system to a higher excitability state by unfavorable working conditions. The critical flicker frequency (CFF) before did not correlate with the results reached during the training. It is suggested that not all persons, selected in random order, react equally on the CFF, at constant external conditions and stimuli.

A66-82245
MEMORY SPAN AND AMOUNT OF INFORMATION.
P. B. Nevel'skii (Kharkov U., Psychol. Lab., USSR).
(Voprosy Psikhologii, vol. 11, no. 4, 1965, p. 85–97).
Soviet Psychology and Psychiatry, vol. 4, Spring 1966, p. 9–19. 20 refs. Translation.

The concept of memory span is defined and the results are stated of several experiments concerning the dependence of memory span on amount of information in material to be memorized. Four conditions demand consideration: (1) the same number of symbols must be presented for memorizing; (2) the symbols must be drawn from homogeneous alphabets; (3) the amount of information in symbols must be determined exactly; and (4) the symbols must be chosen whose amount of information can be decreased by abridging the alphabet of symbols and increasing the probability of their appearance. A series of experiments were conducted: with artificial concepts; with three-digit numbers; and with words. The results of this investigation showed that the establishment of simpler links in memorized material is an important quality in facilitating the act of memorizing. This supposition is in agreement with the informational approach to memory.

A66-82246
HUMAN PERFORMANCE.
John W. Senders.
International Science and Technology, no. 55, Jul. 1966, p. 58–68, 89–90.

The author discusses human performance and the limits of human capacity in tasks which modern man performs with the aid of complex machines; specifically the interaction of man and the machines he operates. Man's limits may be due to various speeds of information transmission in auditory, visual, and motor systems. Another limiting factor arises from man's single-channel nature of attention, which affects his control of operating systems at any given time. Judgment and decision become more automatic with training. The ability to adjust to steady stimulation may affect the threshold of any perception. Mathematics to develop a uniform measure of man's performance is still lacking.

A66-82247
EVOKED POTENTIALS AND REACTION TIMES: A STUDY OF INTRA-INDIVIDUAL VARIABILITY.
Lenore K. Morrell and Frank Morrell (Stanford U., School of Med., Div. of Nuerol., Palo Alto, Calif.).
Electroencephalography and Clinical Neurophysiology, vol. 20, Jun. 1966, p. 567–575. 18 refs.
NASA Grant NsG 215-62.

Experiments with six normal adults were undertaken in order to study the relationship between intra-individual variability in simple reaction time and photically evoked potentials. The amplitudes of prominent components of the evoked response (both early and late) were correlated with the reaction time to the photic signal. The result was found for occipital, central vertex, and right and left Rolandic regions. Latency to peak or trough of various wave components had no consistent relationship to response time (RT). Such factors as selective attention and fluctuations of alertness are discussed as possible determinants of the relationship between RT and amplitude of averaged evoked potentials.

A66-82248
ABSORPTION CAPACITY OF SOME VITAL ORGAN TISSUES AFTER COMBINED EFFECT OF GAMMA RADIATION EXPOSURE AND THERMAL BURNS IN WHITE RATS [DINAMIKA SORBTSIONNYKH SVOISTV NEKOTORYKH VNUTRENNIKH ORGANOV PRI KOMBINIROVANNOM VOZDEISTVII OBSHCHEGO GAMMA-OBLUCHENIIA I OZHOGA].
E. P. Stepanov (Khar'kov Med. Inst., USSR).
Radiobiologiia, vol. 6, no. 3, 1966, p. 349–352. 19 refs. In Russian.

In white rats the combined effect of exposure to 400 r gamma radiation and thermal burns on vital organs and muscle tissues was measured by degree of dye absorption as compared with normal. An increase in the amount of absorbed dye and the slow desorption indicated a considerable degree of injury. The increase in absorption capacity is characteristic of changes in cell protein metabolism.

A66-82249
SPECIFIC EFFECT OF VARIOUS TYPES OF RADIATION ON HIGHER NERVOUS ACTIVITY OF ANIMALS [OB OSOBENNOSTIAKH DEISTVIIA RAZNYKH VIDOV IZLUCHENII NA VYSSHUIU NERVNUIU DEIATEL'NOST'ZHIVOTNYKH].
N. N. Livshits and A. P. Korolevskii (USSR, Acad. of Sci., Inst. of Biol. Phys., Moscow).
Radiobiologiia, vol. 6, no. 3, 1966, p. 411–417. 11 refs. In Russian.

Prior to exposure to radiation, mice and rats were trained to develop a conditioned reflex, which consisted of running to the water container after a stimulus. The latent period of response, the time of running, and the time at the container were recorded. The animals were then exposed to gamma-radiation (300 r CO^{60}), neutrons (1j25 MeV), or protons (510 MeV), and the conditioned reflex was tested after each radiation. In general the disturbance in higher nervous activity after irradiation was greater with an increase in the linear density of ionization. After neutron radiation the latent period increased, and the activity time decreased. The gamma radiation produced similar but milder effects. The proton effect was even less pronounced. The relative biological effect for neutrons was >1, and for protons <1.

A66-82250
DISTRIBUTION OF BLOOD AND GAS IN LUNGS.

J. B. West (Postgraduate Med. School, Clin. Respirat. Physiol. Res. Group, London, Great Britain).
Physics in Medicine and Biology, vol. 11, Jul. 1966, p. 357–370. 19 refs.

Regional differences in lung blood flow and ventilation may be established at present by use of radioactive gases, which include very soluble gases, such as oxygen-15, oxygen-labelled carbon monoxide and carbon dioxide; or poorly soluble gases, such as xenon-133 and nitrogen-13. Methods for each group of gases are described with schematic representation of systems. The results of measurements of blood flow and ventilation in the normal upright lungs of healthy subjects show that blood flow decreases from the bottom to the top of the lung, with virtually no flow at the apex. In supine subjects apical flow becomes equal to basal flow. Ventilation per unit of alveolar volume decreases almost linearly with distance to top in the upright lung, resulting in overperfusion of bottom alveoli. The uneven distribution of blood flow and ventilation in the lung may be due to hydrostatic pressure caused by the structure of the lung.

A66-82251
DIFFUSION OF GASES IN THE LUNGS.
R. E. Forster.
Physiologist, vol. 9, May 1966, p. 110–122. 45 refs.

The pulmonary diffusing capacity of the lungs (D_L) can be expressed as a quotient of rate of gas transfer in ml./min. over mean pressure difference between alveolar gas and blood in mm. Hg. This diffusion is considered to be a passive physiochemical process. D_L has been shown to depend on a number of factors: (1) body size; (2) age, (3) alveolar volume, (4) minute ventilation, (5) body temperature, (6) time of day, (7) alveolar oxygen and carbon dioxide pressure, (8) oxyhemoglobin, (9) pulmonary blood flow and vascular pressure, (10) exercise and body position, and (11) nonuniform distribution of capacity throughout the lung. Some factors are associated with hemodynamic changes in the lungs. In each case a graph is presented to show the relationship.

A66-82252
NEW APPROACH TO PATTERN PERCEPTION.
Christopher Evans (Natl. Phys. Lab., Autonomics Div., Great Britain).
Discovery, vol. 27, Aug. 1966, p. 17–21.

Old and new methods of holding an image steady on the retina of the eye are described. The after-image method offers both a simple approach to the study of pattern perception with stabilized images and a novel technique for mapping the human retina.

A66-82253
AUTOMATION AND TELEMETRY IN COSMIC MEDICINE [AVTOMATIKA I TELEMETRIIA V KOSMICHESKOI MEDITSINE].
A. Kalinovskii.
Aviatsiia i Kosmonavtika, no. 7, Jul. 1966, p. 17–19. In Russian.

In order to process all physiological data received during space flights automatic recorders and telemetric devices are used extensively. The telemetric information is usually registered on film as graphs. This form of information is further transformed into electric signals and the coded form of a computer card which can be processed automatically. Schematic outlines of two recording-processing systems are presented.

A66-82254
ORIENTATION AND ACTIVITY IN WEIGHTLESS SPACE [ORIENTATSIIA I DEIATEL'NOST' V BEZOPORNOM PROSTRANSTVE].
E. Ivanov, V. Popov, and L. Khachatur'iants.
Aviatsiia i Kosmonavtika, no. 7, Jul. 1966, p. 20–24. In Russian.

Several frames of the film recording the extravehicular activity of the Soviet cosmonaut Leonov are reproduced for the first time. A table and three graphs are included with data obtained during training and actual mission. There was little difference between training figures and the actual space walk, except in the cosmonaut's speed of motion. The actual flight deviated 20–30% from average velocity during training; the deviation from maximum reading in some instances was 50%. Only 65–70% of the proposed exercises could be accomplished in actual flight.

A66-82255
BIOELECTRICAL ACTIVITY OF MUSCLES ANTAGONISTS DURING ISOTONIC TRAINING [O BIOELEKTRICHESKOI AKTIVNOSTI MYSHTS-ANTAGONISTOV V PROTSESSE VYRABOTKI DVIGATEL'NOGO NAVYKA].
Ts. Kh. Bratanova (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow and Advan. Med. Inst., Dept. of Physiol., Sofiia, Bulgaria).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 16, May–Jun. 1966, p. 411–416. In Russian.

By means of the electromyography (EMG) technique, a study was made of changes in the work of human muscles-antagonists (m. biceps and triceps) in the process of training for rhythmical lifting and lowering a weight (2 kg.) by moving the forearm. Changes in electrical activity during the movement were determined by EMG and the data were averaged for a series of movements. At the beginning of the training, activity of the m. triceps was observed in the extension phase; gradually it disappeared, and the extension was effected only under the action of the load. This motor stereotype, energetically more advantageous, discontinued at any changes in the conventional sequence of experiments (changes in the duration of the cycle, interruptions in experiments, etc.). The excitation of the flexor was accompanied by a slight excitation of the extensor at all stages of training. Such activity of the antagonist is apparently the result of excitation radiation.

A66-82256
CONDITIONED REFLEXES IN DOGS TO PURE TONES IN THE RANGE OF 530 TO 15,000 C.P.S. [OSOBENNOSTI USLOVNOREFLEKTORNOI DEIATEL'NOSTI SOBAK PRI VYRABOTKE REFLEKSOV NA CHISTYE TONY V DIAPAZONE 530–15000 GTS].
N. N. Lazuko (USSR, Acad. of Med. Sci., Inst. of Exptl. Med., I. P. Pavlov Physiol. Dept., Leningrad).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 16, May–Jun. 1966, p. 443–448. 7 refs. In Russian.

Pure tones (530, 820, 10,000 and 15,000 c.p.s.) presented in a stereotype as positive and inhibitory conditioned stimuli disturbed conditioned activity in dogs. Such disturbances set in sooner in dogs untrained for tones. Elaboration and stabilization of conditioned reflexes proceeded with greater difficulty to high frequency tones than to low frequency tones and required specific conditions (alternating experiments with rest days). Pure tones applied systematically for a long time and addressed to a limited region of the acoustic analyser apparently became superstrong for the animals' nervous system. A decrease in conditioned reflexes, phasic states, drastic

motor excitation and refusal to eat were observed. Evidently transmarginal inhibition set in, which irradiated over the cortex, and hypnotic phases appeared on the inhibitory background.

A66-82257

RECOVERY CYCLES OF EVOKED POTENTIAL AT DIFFERENT LEVELS OF THE VISUAL CORTEX IN RABBITS [TSIKLY VOSSTANOVLENIIA VYZVANNYKH POTENTSIALOV NA RAZNYKH UROVNIAKH ZRITEL'NOI KORY KROLIKA].

A. Ia. Supin (M. V. Lomonosov Moscow State U., Dept. of Physiol. of Higher Nervous Activity and Lab. of Bionics, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 16, May–Jun. 1966, p. 496–505. 30 refs. In Russian.

Evoked potentials were recorded at different layers of the visual cortex of rabbits in response to paired electrical stimulations of the optic nerve. A primary response (PR) to the test stimulus, recorded on the surface, was blocked at small (up to 50 to 70 msec.) intervals between the conditioning and test stimuli and at intervals at which the test stimulus took place at the end of alpha-like wave induced by the first stimulus. The surface PR was fully restored only at intervals of about 700 to 900 msec. The depth-negative phase of PR to the test stimulus appeared already at rather short (about 10 msec.) intervals between the stimuli, and did not undergo any drastic change at any further increase of intervals. Thus at certain intervals between stimuli there was no surface-positive phase but there was a depth-negative one, which indicated their generation by different synapse systems. At intervals between the stimuli of about 70 to 100 msec. an evoked potential emerged whose duration somewhat exceeded that of PR. During a further increase of intervals this slow response at first grew and then (at intervals of about 200 msec.) rapidly diminished and practically disappeared. In the deep cortical layers an inverted mirror image of the surface slow response was observed in some cases.

A66-82258

INFLUENCE OF CHLORPROMAZINE ON SOME ASPECTS OF OXIDATIVE METABOLISM AND ON THE ULTRA STRUCTURE OF MITOCHONDRIA IN THE BRAIN [VLIIANIE AMINAZINA NA NEKOTORYE STORONY OKISLITEL'NOGO OBMENA I UL'TRASTRUKTURU MITOKHONDRII MOZGA].

Z. D. Pigareva, E. L. Dovedova, and N. N. Bogolepov (USSR, Acad. of Med. Sci., Inst. of Brain, Moscow).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 16, May–Jun. 1966, p. 506–512. 38 refs. In Russian.

Morphological, biochemical, and submicroscopic changes in the central nervous system were studied in cats and rats under the influence of 10 mg./kg. doses of chlorpromazine. Chlorpromazine in vivo reduced the components of the system of hydrogen and electron transfer (flavoproteids and cytochromes a b, c, a_3) in mitochondria of different parts of the motor analyzer in cats. The greatest change was recorded in the cortical end of the analyzer. Considerably pathological changes in mitochondria were revealed by means of the electron microscope, which showed a decreased number of cristae, and the appearance of fragments of these organelles.

A66-82259

ALTERNATING TYPE OF UNIT RESPONSE IN POSTERIOR COLLICULI OF CATS TO ACOUSTIC STIMULATION [AL'TERNIRUIUSHCHII TIP REAKTSII NEIRONOV ZADNEGO DVUKHOLMIIA KOSHKI PRI ZVUKOVOM RAZDRAZHENII].

Ia. A. Al'tman (USSR, Acad. of Sci., I. P. Pavlov Inst. of Physiol., Lab. of Phys. Hearing, Leningrad).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 16, May–Jun. 1966, p. 531–534. 12 refs. In Russian.

A very specific type of response was noted in anesthetized cats when exposed corpora quadrigemina of the brain were stimulated by short clicks. Opposite responses were registered to consecutive clicks: the first click caused a prolonged discharge, while the second click caused a disappearance of the response. The alternating effect was stable and was produced by various frequencies from 0.5 to 0.1 c.p.s. Besides this response the neurons produced an initial discharge with a latent period of 10–30 msec., and a 100–1000 msec. period preceding the alternating response. This neurophysiological phenomenon is probably connected with the memory mechanism.

A66-82260

SIMPLE ANALYZER OF LOW FREQUENCIES FOR STUDYING BRAIN RESPONSES TO RHYTHMICAL STIMULI [PROSTOI ANALIZATOR NIZKIKH CHASTOT DLIA IZUCHENIIA REAKTSII MOZGA NA RITMICHESKIE RAZDRAZHITELI].

V. A. Il'ianok (USSR, Acad. of Sci., Inst. of Higher Nervous Activity and Neurophysiol., Moscow).
Zhurnal Vysshei Nervnoi Deiatel'nosti, vol. 16, May–Jun. 1966, p. 564–570. In Russian.

A simple analyzer of low frequencies for studying brain responses to rhythmical stimuli is described. This device can be used to separate from the electroencephalogram frequencies of 5, 8, 14, 20 and 30 c.p.s. A schematic representation of the analyzer is given. Various modes of regulating the device according to problem design are presented.

A66-82261

A JAPANESE SYSTEM FOR THE ROUTINE REMOTE MONITORING OF PHYSIOLOGICAL PHENOMENA WITH MANY PATIENTS.

World Medical Electronics, vol. 4, Aug. 1966, p. 229–230.

A Japanese system for the remote monitoring of routine physiological data simultaneously on a number of patients is described. The system, which utilizes individual transmitters and a central control station, can take care of 288 patients, in 12 groups of 24 each, under supervision of one operator. The system described can be used for a single reading or a continuous recording of body temperature and pulse rate. The central control system consists of an intercom unit and a control unit circuit with the main selector switch and indicating lamps, pulse rate and temperature amplifiers, bed scanner unit, memory circuits, analog to digital converter, and digital printer.

A66-82262

CHARACTERISTIC PROPAGATION OF ASCENDING IMPULSES WHICH AFFECT SYNAPTIC STRUCTURE OF BRAIN CORTEX DURING HUNGER [OSOBENNOSTI RASPROSTRANENIIA VOSKHODIASHCHIKH AKTIVIRUIUSHCHIKH VLIIANII NA SINAPTICHESKIE ORGANIZATSII KORY MOZGA PRI GOLODE].

K. V. Sudakov and E. M. Nabil' (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Lab. of Gen Physiol. of Central Nervous System, Moscow).
Fiziologicheskii Zhurnal SSSR, vol. 52, Jul. 1966, p. 785–794. 11 refs. In Russian.

Experiments on cats and rabbits showed that ascending impulses of the hypothalamus during hunger were directed

to the synaptic structures of the frontal areas of the brain cortex. Food stimulation during hunger blocked propagation of impulses, caused by stimulation of the sciatic nerve to the synaptic areas. During hunger the negative phases of the primary response were blocked leading to the conclusion that the ascending impulses of the subcortical areas of the digestive center are directed to the axodendrite synapses of the frontal lobes.

A66-82263
NORMAL 24-HOUR RHYTHM OF PHYSIOLOGICAL FUNCTIONS IN WORKING MAN [O NORMAL'NOM SUTOCHNOM RITME FIZIOLOGICHESKIKH FUNKTSII RABOTAIUSHCHEGO CHELOVEKA].

S. O. Ruttenburg (Inst. of Hyg. Labor and Prof. Diseases, Leningrad, USSR).

Fiziologicheskii Zhurnal SSSR, vol. 52, Jul. 1966, p. 855–859. 9 refs. In Russian.

A group of subjects (197 trade school students and 148 adult workers) were given a physical check-up to establish the normal diurnal rhythm of physiological functions in working men. The average body temperature variation in adults was 0.80°C. In minors, two types of curves were received, with one peak, when the temperature variation was 0.85°C; and with two peaks at variation of 0.90°C. The daily variation of pulse rate was 18 per min. in adults, and 19 per min. in youths. The highest average values for body temperature and pulse rate were recorded between 4:00 p.m. and 6:00 p.m. The diurnal ratio of variation reflects stimulating (8:00 a.m. to 6 p.m.) and suppressing (6:00 p.m. to 4:00 a.m.) processes of the central nervous system.

A66-82264
HIGH ALTITUDE PROBLEMS—HYPOXIA.

S. D. Nishith, A. K. Ganguly (Jawaharlal Inst. of Post-Graduate Med. Educ. and Res., Pondicherry, India), and N. D. P. Karani (Armed Forces Med. Coll., Poona, India).

Punjab Medical Journal, vol. 16, Aug. 1966, p. 47–49. 5 refs.

A brief review is presented on studies of hypoxia as one of the high altitude problems. The topics discussed are: (1) effects of acute hypoxia on blood composition, volume, oxygen carrying capacity, and acidity; (2) effects on heart, blood pressure, and circulation; (3) effects on respiration, and pathological symptoms in connection with respiratory disturbance; (4) effects of chronic hypoxia on physiological functions; and (5) process of acclimatization and changes in vascular bed of lungs and in general metabolism.

A66-82265
ADVANCED AVIATION MEDICINE—SUPERSONIC TRANSPORTATION AND OTHER EXOTIC AIRCRAFT.

Stanley R. Mohler (FAA, Civil Aeromed. Res. Unit, Oklahoma City, Okla.).

(Civil Aviation Med. Assn. and FAA, Symp., Oklahoma City, Oct. 7-9, 1965).
Texas Reports on Biology and Medicine, vol. 24, Supplement, Jun. 1966, p. 392–401. 39 refs.

Three key concerns relative to anticipated supersonic transport (SST) will be: cosmic rays, explosive decompression, and sonic booms. By adequate solar-flare warning system a descent to the 50,000-foot level should provide atmospheric shielding sufficient to protect personnel against ionizing radiation. At present the maximum permissible exposure for occupational levels is 5 rem/yr. or 0.1 μc. Because emergency subsonic speeds will require lower altitude, decompression equipment must be on board. Sonic booms which will accompany SST operations will require attention to two types of problems: breakage of property, and physiological discomfort. Man may develop tolerance to booms, because children seem to withstand their effects better than adults.

A66-82266
EFFECTS OF INTERMODAL STIMULATION ON FIGURAL AFTER-EFFECTS.

K. Paul Satinder (Panjab U., Dept. of Psychol., Chandigarh, India).

British Journal of Psychology, vol. 57, May 1966, p. 1–5. 14 refs.

Verification was sought for the assumption by Köhler and Wallach (1944) that figural after-effect is a phenomenon specific to any given sense modality. Results contradicted Köhler and Wallach and Jaffe (1956), as concurrent stimulation in different sense modalities affected significantly the figural after-effects occurring in other sense modalities in the absence of any size relation between the stimuli. The results supported the hypothesis of sensory interaction, suggested by Soviet research.

A66-82267
VARYING THE NUMBER OF ALTERNATIVES IN SHORT-TERM RECALL.

Muriel M. Woodhead (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).

British Journal of Psychology, vol. 57, May 1966, p. 45–52. 13 refs.

Performance on a task of continuing memory span improved as the number of alternative items increased, in contrast to short-term recall from single presentations. The tentative explanation offered is that the difficulty of organizing items in chunks during continuing recall increases as the amount of information decreases.

A66-82268
WORKING BACKWARD AND WORKING FORWARD IN PROBLEM-SOLVING.

W. S. Anthony (Hull U., Inst. of Educ., Great Britain).

British Journal of Psychology, vol. 57, May 1966, p. 53–59. 19 refs.

N. E. Miller (1959) and others have stressed the effectiveness and creativity of working backward in problem-solving; but Newell, Shaw, and Simon (1962) argued that working backward is not inherently superior to working forward. An experiment is reported in which undergraduate subjects were set a series of route-finding tasks in a maze-situation modified to allow observation of working forward and working backward. The effectiveness of the two directions of work was controlled. The method and results of the experiment are discussed in relation to the views of the above-named writers and others.

A66-82269
THE EFFECT OF SHORT PERIODS OF FOOD-DEPRIVATION ON HUMAN PERFORMANCE.

R. A. Kennedy and A. G. Keene (Melbourne, U., Australia).

British Journal of Psychology, vol. 57, May 1966, p. 93–97. 14 refs.

This study reports the effect of periods of food-deprivation varying from 0 to 10 hr. on human performance in two simple

tasks. The argument is advanced that an interpretation of the results in terms of traditional Hullian multiplicative drive theory is unsatisfactory. A possible alternative to this approach is considered, and results tend to support the Yerkes–Dodson law.

A66-82270
THE EFFECTS OF DISTRACTION ON PURSUIT ROTOR LEARNING, PERFORMANCE AND REMINISCENCE.
Hans J. Eysenck and Warren Thompson (London U., Inst. of Psychiat., Great Britain).
British Journal of Psychology, vol. 57, May 1966, p. 99–106. 9 refs.
D.S.I.R. supported research.

Five groups of thirty subjects were equated for performance on the pursuit rotor, and were then given massed practice under conditions of no distraction, a little, medium or considerable distraction, as well as a control distracting condition. Performance declined proportionally to the amount of distraction given; the effect of distraction was on performance only, and not on learning. During a subsequent rest pause half the subjects were given a distracting task, the other half were simply rested; performance after this rest period failed to show any effect of the distracting task on consolidation processes theoretically taking place during the rest period.

A66-82271
THE EFFECT OF DRIVE ON PERFORMANCE AND REMINISCENCE IN A COMPLEX TRACING TASK.
H. J. Eysenck and R. A. Willett (London U., Inst. of Psychiat., Great Britain).
British Journal of Psychology, vol. 57, May 1966, p. 107–112. 14 refs.
D.S.I.R. supported research.

An experiment is reported in which high-drive and low-drive groups equated for intelligence were given a complex tracing task. Under conditions of spaced practice the low-drive group performed significantly better than the high-drive group, and similar differences were observed under conditions of massed practice. A rest pause of 10 min. was interpolated in the performance of the groups tested under conditions of massed practice, and reminiscence was greater for the low-drive groups than for the high-drive groups. Significant post-rest decline of performance under massed conditions was observed only for the groups having long pre-rest massed practice and not for those having short pre-rest massed practice.

A66-82272
PERSONALITY AND JUDGMENTS OF TEMPORAL INTERVALS.
C. R. Bell and Anne N. Watts (Med. Res. Council, Environ. Physiol. Res. Unit, London School of Hyg. and Trop. Med., Great Britain).
British Journal of Psychology, vol. 57, May 1966, p. 155–159. 23 refs.

The ways in which subjects performed a number of time-estimation tasks were examined for associations with normal pulse rate, normal oral temperature, age, sex, intelligence and personality characteristics. No universal relations were found in the data, though there was evidence to suggest that age, pulse rate, oral temperature and some aspects of personality possibly are worthy of further research to determine whether they might be related to some types of time estimation.

A66-82273
GEOMETRIC ILLUSIONS AND ENVIRONMENT: A STUDY IN GHANA.
Gustav Jahoda (Strathclyde U., Glasgow, Scotland).
British Journal of Psychology, vol. 57, May 1966, p. 193–199. 17 refs.

Segall, Campbell and Herskovits (1963, 1966) put forward the view that the Müller–Lyer illusion is a function of rectangularity in the environment, and that the horizontal–vertical one depends on openness of terrain. Existing contrasts in these two variables in Ghana were used in an attempt to investigate the hypotheses. A total of 213 illiterate subjects were tested, and 41 subjects in Britain. A significant over-all difference in the expected direction between Ghanaian and British subjects was obtained with the Müller–Lyer, but no differences corresponding to environmental variations emerged on either of the illusions within the subgroups of Ghanaian subjects. The reasons for this partial failure to replicate are examined in the light of other studies, and some theoretical implications are discussed.

A66-82274
INDUCTION OF STEREOSCOPIC DEPTH EFFECTS.
Nicholas Pastore and Marlene Terwilliger (New York City U., Queens Coll., N. Y.).
British Journal of Psychology, vol. 57, May 1966, p. 201–202.

Three stereograms (2 congruent and 1 non-congruent) were tested for depth effects. The induction effect (IE) looked for occurs when the introduction of a context which itself appears in depth induces the opposite effect in fused horizontal lines. Horizontal lines with vertical components (stereogram A) induced perceived curvatures while the squares (stereograms B and C) appeared to be rotated. The results support the generality of the IE, but there is some degree of difference in individuals and in the stereograms used.

A66-82275
INDIVIDUALS AND US.
Julien M. Christensen (AF Systems Command, Aerospace Med. Div., Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
(Human Factors Soc., 9th Ann. Meeting, Dayton, Ohio, Oct. 20, 1965).
Human Factors, vol. 8, Feb. 1966, p. 1–6. 8 refs.

Since behavior is a function of both heredity and environment, it is axiomatic that those who directly or indirectly structure the environment determine to some extent the behavior of the residents of that environment. Systems and design engineers are responsible for a very significant proportion of the artifactual elements of a modern society and probably have a much greater influence on human behavior than has been generally recognized. Insofar as possible the human factors specialist should assure that the jobs and man–machine interactions created by specific designs not only take advantage of man's presence but also contribute positively to his personal development and fulfillment.

A66-82276
FLIGHT BY PERISCOPE: MAKING TAKEOFFS AND LANDINGS; THE INFLUENCE OF IMAGE MAGNIFICATION, PRACTICE, AND VARIOUS CONDITIONS OF FLIGHT.
Stanley N. Roscoe (Hughes Aircraft Co., Culver City, Calif.), Scott G. Hasler (Bunker-Ramo Corp., Canoga Park, Calif.), and Dora J. Dougherty (Bell Helicopter Co., Fort Worth, Tex.)
Human Factors, vol. 8, Feb. 1966, p. 13–40.
Contract ONR N6ori-71.

A66-82277

A study was made of the use and effectiveness of a projection-type periscope employed as an aircraft cockpit display in the performance of ground-reference flight maneuvers such as takeoffs and landings. Exploratory test flights demonstrated that pilots can make safe takeoffs and landings by periscope using a variety of techniques and under a variety of conditions. In a systematically balanced and controlled experiment, six highly experienced pilots each made 60 takeoffs and landings by periscope, an equal number being made in each of three experimental conditions involving different image magnifications. Each pilot also made 20 landings in the control condition of contact visibility. While safe takeoffs and landings were made by periscope under all experimental conditions, the accuracy of the landings, both in terms of constant and variable errors, was significantly influenced by the image magnification being employed. The mean point of touchdown for periscope landings was an inverse linear function of image magnification, the optimum magnification being the one that resulted in the correct apparent distance of objects viewed through the periscope. Variable errors in point of touchdown, as well as constant errors, were increased as a result of departures in either direction from this optimum magnification factor. The accuracy of the periscope landings made by the six pilots during their early trials was not comparable to the accuracy of their contact landings. However, their improvement with practice, under all experimental conditions, was so rapid that, at the conclusion of the experiment, their point of touchdown variability scores for periscope and contact landings were not significantly different.

A66-82277
TELESCOPE FIELD OF VIEW REQUIREMENTS FOR STAR RECOGNITION.
R. W. Allen and M. L. Hershberger (Hughes Aircraft Co., Aerospace Group, Culver City, Calif.).
Human Factors, vol. 8, Feb. 1966, p. 41–47. 8 refs.
Contract AF 04(695)-642.

An experimental study was conducted by Hughes Aircraft Company to determine telescope field of view requirements for human recognition of navigation stars. The study was conducted at the Griffith Park Planetarium in Los Angeles. Four Air Force navigators viewed the night sky projected on the planetarium dome through a simulated telescope. The subjects had control of telescope azimuth and elevation. The telescope had unity power fields of view ranging between 10 and 45 degrees. The subjects were required to identify and acquire any one of the 35 major navigation stars. The results revealed a significant inverse relationship between field of view size and navigation star acquisition-identification time. Identification errors also varied inversely as a function of field of view size, and mean acquisition-identification times were significantly different between subjects. The minimum field of view required for rapid, accurate star identification–acquisition was established to be between 25 and 30 degrees.

A66-82278
REPRESENTATION AND STRATEGY IN DIAGNOSTIC PROBLEM SOLVING.
Paul M. Wortman (Carnegie Inst. of Technol., Pittsburgh, Pa.).
Human Factors, vol. 8, Feb. 1966, p. 48–53. 10 refs.
Grant NIH GM 11734-02.

Four experiments investigating diagnostic problem solving by clinical neurologists were performed. From protocols or verbal reports of physicians diagnosing neurological diseases, several elementary structures used in clinical decision-making were identified and compared to precisely defined information-processing primitives. A separate experiment established the reliability of the protocol information. The use of a tree structure as a representational model of the diagnostic process was tested, but not confirmed. In another experiment the implications of the elementary structures for the diagnostician's search strategy was discussed and two more strategy characteristics were noted. Some hypotheses for an alternative representation and strategy were offered and it was suggested that a computer program could be used as a final test of this model.

A66-82279
A STUDY OF A MULTISTAGE DECISION MAKING TASK WITH AN UNKNOWN DURATION.
Amnon Rapoport (N. C. U., Chapel Hill).
Human Factors, vol. 8, Feb. 1966, p. 54–61. 13 refs.

Thirteen college students participated individually in a multistage decision making task. The task consisted of eight different computer-controlled problems. The duration of each problem was not known to the decision maker. A dynamic programming model employing Bayesian notions was constructed for the adaptive decision making task, tested, and confirmed. An alternative explanation is discussed briefly.

A66-82280
THE MEASUREMENT OF ATTITUDES TOWARD MAN–MACHINE SYSTEMS.
Carole E. Bare (Calif. U., Los Angeles).
Human Factors, vol. 8, Feb. 1966, p. 71–79.

To explore and increase the understanding of man–machine relationships, an instrument designed to assess attitudes toward machines was developed and tested. The scaling techniques used in the instrument were based on the work of Charles Osgood with the Semantic Differential (1957). One hundred subjects, consisting of professionals experienced with various machine systems, i.e., programmers, engineers, human factor and operations research scientists, were asked to describe the characteristics of ten machines (radio, radar, automobile, man, computer, teletype, bulldozer, bicycle, welding torch, and watch), by means of forty-two adjectives. The results indicate that the developed instrument can be used effectively for the assessment of man–machine attitudes. The hypothesized attitudes toward control and power, toward machines as an extension of man's capabilities, and toward change did emerge; however, typical Osgood factor patterns were not obtained in most of the analyses. The steps for modification of the test instrument and validation of it against performance criteria are discussed.

A66-82281
CONTROL OF THE SYSTEMIC CIRCULATION IN HYPOXIA.
P. I. Korner (New South Wales U., School of Physiol., Sydney, Australia).
IN: XXIII INTERN. CONGR. OF PHYSIOL. SCI., TOKYO, JAPAN, SEP. 1–9, 1965. LECTURES AND SYMP.
Edited by D. Noble.
Amsterdam, Excerpta Medica Found., 1965, p. 137–152. 65 refs.
Life Insurance Med. Res. Fund, Australia and New Zealand and Natl. Heart Found., Australia supported research.

In primary tissue and arterial hypoxia, the local effects of changes in oxygen and carbon dioxide tension determine the distribution of peripheral blood flow. In primary tissue hypoxia

the activation of the autonomic nervous system is less extensive than in arterial hypoxia. Baroreceptor reflexes limit the local effects of tissue hypoxia by affecting resistance vessels and increasing cardiac output. In arterial hypoxia, the effects of arterial chemoreceptor stimulation are superimposed on local response. Hyperventilation resulting from arterial chemoreceptor stimulation minimizes the reduction in arterial and tissue oxygen tension, and high cardiac output response contributes to optimal tissue oxygenation. Pulmonary afferent stimulation and hypocapnia constitute a feedback mechanism limiting the chemoreceptor stimulation. The result is bradycardia, reduction in cardiac output, and peripheral vasoconstriction, and can be regarded as an emergency mechanism to maintain oxygen supply to brain and heart. The high output response maintains normal resting oxygen consumption and serves as an adaptive mechanism during hypoxia.

A66-82282
EXERCISE AND THE CIRCULATION.
J. T. Shepherd (Mayo Clin. and Mayo Found., Sect. of Physiol., Rochester, Minn.).
IN: XXIII INTERN. CONGR. OF PHYSIOL. SCI., TOKYO, JAPAN, SEP. 1–9, 1965. LECTURES AND SYMP.
Edited by D. Noble.
Amsterdam, Excerpta Medica Found., 1965, p. 153–156. 22 refs.

In dogs with denervated hearts, the capacity for exercise was little altered, as measured by stroke volume, oxygen consumption, heart rate, and blood pressure. The response of human limb vessels was also examined by studying venous pressure-limb volume relationships, changes in pressure in vein segments temporarily isolated from circulation, and pressure in limb veins distal to an inflated pneumatic cuff. It is concluded that complex reflex adjustments via the sympathetic nerves are required if exercise of any severity is to be performed.

A66-82283
COORDINATION OF CIRCULATION DURING EMOTION.
J. Brod (Inst. for Cardiovascular Res., Prague, Czechoslovakia).
IN: XXIII INTERN. CONGR. OF PHYSIOL. SCI., TOKYO, JAPAN, SEP. 1–9, 1965. LECTURES AND SYMP.
Edited by D. Noble.
Amsterdam, Excerpta Medica Found., 1965, p. 157–164. 24 refs.

Human circulatory response was studied during emotional stress (a stimulus consisting of simple arithmetic demanded at a rate unable to be filled, or a cold stimulus connected with a sensation of pain). The changes in the circulatory system corresponded to changes observed during muscular exercise: increased vascular pressure and shift of blood to muscles, brain, and myocardium. There were, however, differences at the cerebral and muscular levels. Contrary to increased blood flow and oxygen consumption during mental arithmetic, cerebral blood flow decreased, vascular resistance rose, and oxygen consumption changed little during moderate exercise. In the muscles, the blood was shifted as part of a primary hemodynamic response independent of any change in metabolic needs.

A66-82284
A DUPLEX THEORY OF THE MECHANISM OF CUTANEOUS SENSATION WITH SPECIAL REFERENCE TO PAIN.
P. D. Wall (Mass. Inst. of Technol., Res. Lab. of Electron. and Dept. of Biol., Cambridge) and R. Melzack (McGill U., Dept. of Psychol., Montreal, Canada).
IN: XXIII INTERN. CONGR. OF PHYSIOL SCI., TOKYO, JAPAN, SEP. 1–9, 1965. LECTURES AND SYMP.
Edited by D. Noble.
Amsterdam, Excerpta Medica Found., 1965, p. 234–241. 16 refs.

This theory of cutaneous sensation proposes that incoming messages in peripheral nerves and central mechanisms have a double aspect. One aspect is the orientation setting system which is concerned with the orientation and setting of the central analysis mechanism. The other aspect, the action demand system, deals with the actual process of filtering the incoming information through the preset and resetting analysis filters which leads to the triggering of the required adaptive response. We suggest that the process of analysis begins at the first central synapse in the cord whose sensitivity is set in part by the nature of the preceding afferent barrage. An important factor in this barrage is the relative number of impulses in large versus small diameter fibers. The double process of orientation and transmission proceeds over subsequent pathways. The idea of a specific pain alarm system is rejected and it is suggested instead that pain is the consequence of the attainment by central cells of a predetermined spatially and temporally integrated firing level. The effectiveness of a particular afferent volley in triggering pain reactions depends on preceding and simultaneous events which have set the analysis mechanisms.

A66-82285
BEHAVIOURAL AND EEG EFFECTS OF PARADOXICAL SLEEP DEPRIVATION IN THE CAT.
M. Jouvet (School of Med., Lyon, France).
IN: XXIII INTERN. CONGR. OF PHYSIOL. SCI., TOKYO, JAPAN, SEP. 1–9, 1965. LECTURES AND SYMP.
Edited by D. Noble.
Amsterdam, Excerpta Medica Found., 1965, p. 344–353. 21 refs.

Electroencephalographic and electromyographic activity were recorded continuously from normal cats deprived of paradoxical sleep (P.S.) for periods of 1 to 26 days and in chronic pontile cats. Instrumental deprivation of P.S. in normal cats for periods of longer than one weak resulted in changes in sleep–wake behavior, tachycardia, sleepy appearance, muscular weakness, and hypotonia. Chronic pontile cats (by total section of the brainstem) exhibited only the states of wakefulness and P.S.; in such preparations, suppression of P.S. by shock demonstrated a "need for P.S.". Suppression of P.S. by circumscribed lesions of the pontine reticular formation brought about striking changes in behavior resembling hallucinations one to two weeks after the lesion; there was also permanent tachycardia.

A66-82286
EFFECT OF EMOTION ON FLYER'S PROFESSIONAL ACTIVITY [ZNACHENIE EMOTSII V PROFESSIONAL'NOI DEIATEL'NOSTI LETCHIK A]
P. V. Buianov and F. P. Kosmolinskii.
Voenno-meditsinskii Zhurnal, no. 6, Jul. 1966, p. 63–65. In Russian.

Active flying usually affects the functional state of the cardiovascular system of pilots. In most cases the pulse rate and blood pressure increase and certain changes are noted in the electroencephalogram. The degree of these changes

depends on the emotional stability of the individual, the difficulty of the mission, and on the amount of training. The effect is less in cases when a similar assignment has been performed before and the pilot is familiar with conditions of flight. Any new assignment causes emotional stress, and in some emotionally unstable individuals may produce a marked disturbance in the cardiovascular system. As a rule, no matter how experienced is the pilot, during flight he shows a physiological stress which can be noted in the strained pose, changes in skin coloring, and often sweating. Pulse rate may reach 100. During special assignments, such as in-flight refueling, the pulse rate has been registered at 160–186, and the respiration rate at 40–54. As a result of this emotional stress the body temperature increases, and may result in a considerable loss of weight during mission. All these factors must be considered in selecting crew for dangerous missions.

A66-82287
BLOOD FLOW AND METABOLISM OF FOREARM MUSCLE IN MAN AT REST AND DURING SUSTAINED CONTRACTION.

Hermes A. Kontos, David W. Richardson, and John L. Patterson, Jr. (Va. Med. Coll., Dept. of Med., Richmond).

American Journal of Physiology, vol. 211, Oct. 1966, p. 869–876. 23 refs.

Contract NONR-1134, Grants NIH HTS-5573 and FR 000 16-02.

The distribution of total forearm blood flow (TFBF) between skin and muscle was determined in 21 normal subjects by epinephrine iontophoresis. There was a linear relationship between TFBF on one hand, and forearm muscle or forearm skin blood flow on the other hand. Muscle blood flow averaged 60.2% (range 46.4–76%)m of TFBF. During sustained contraction of forearm muscles in seven subjects, oxygen consumption of muscle increased by an average of 293% of the control value. This increase was met primarily by increases in blood flow and to a much lesser extent by increased extraction of oxygen. A good linear correlation between oxygen consumption or CO_2 production of forearm muscle and muscle blood flow was found for the combined resting and exercise data. On the basis of the changes in deep forearm venous blood PO_2 and P_{CO_2} during exercise, and assuming that these changes are reasonably close approximations of the changes in tissue gas tensions, it was suggested that local hypoxia and hypercapnia cannot account entirely for functional hyperemia of skeletal muscle.

A66-82288
CONDITIONED PHYSIOLOGICAL ADAPTATION TO ANTICHOLINERGIC DRUGS.

B. Korol, I. W. Sletten, and M. L. Brown (Mo. U., School of Med., Mo. Inst. of Psychiat., Dept. of Psychiat., St. Louis).

American Journal of Physiology, vol. 211, Oct. 1966, p. 911–914. 9 refs.

Grant NIH MH 11379-02.

In conscious, unrestrained dogs, multiple intravenous treatments with equivalent doses of atropine sulfate and atropine methyl nitrate produced conditioned responses of paradoxical salivation and classical mydriasis with comparable onset, peak effects, and extinction rates. Since atropine methyl nitrate does not readily enter the central nervous system, it is concluded that these conditioned responses are the result of peripheral anticholinergic drug actions. Pretreatment with the alpha adrenergic blocker, phenoxybenzamine, selectively inhibited the mydriatic response whereas administration of propranolol, a beta adrenergic blocker, preferentially inhibited the conditioned salivation. It is concluded that the salivary and mydriatic responses resulted from conditioned physiological adaptation mediated through a central sympathetic reflex and with efferent alpha and beta adrenergic pathways.

A66-82289
HYPOTHALAMIC REGULATION OF SPONTANEOUS SALT INTAKE IN THE RAT.

A. Nováková (Inst. for Cardiovascular Res., Prague, Czechoslovakia) and J. H. Cort (Manitoba U., Dept. of Pharmacol. and Therap., Winnipeg, Canada).

American Journal of Physiology, vol. 211, Oct. 1966, p. 919–925. 20 refs.

Adult male rats, maintained in metabolism cages, were depleted of Na by hydrochlorothiazide administration and a salt-free synthetic diet which contained sufficient K to balance urinary losses of the latter cation. Before and after the depletion period the rats were presented with a free choice of tap water, physiological saline, and a saline containing 20 g./liter NaCl. During administration of the diuretic only tap water was available. Normal rats reacted to the depletion by markedly increasing spontaneous salt intake and regaining salt balance, with some overshooting, within three days. The same animals were then subjected to hypothalamic electrolytic lesions at various sites in the midhypothalamus, and the response to a new depletion period was again tested. With lesions in the region of the ventromedial nucleus of the hypothalamus the animals failed to increase salt intake after depletion; with other lesions, even in the close vicinity of the ventromedial nucleus, this effect was not observed.

A66-82290
MECHANISM OF THE EEG-SYNCHRONIZING ACTION OF SEROTONIN.

Werner P. Koella and John Czicman (Worcester Found. for Exptl. Biol., Lab. of Neurophysiol. and Neuropharmacol., Shrewsburg, Mass.).

American Journal of Physiology, vol. 211, Oct. 1966, p. 926–934. 42 refs.

Grants NIH MH-02211 and K3-MH-14,228-06.

In cats anesthetized with Dial and urethan, or treated with Flaxedil and sedated with 1/10 surgical dose of Dial and urethan, intracarotid injection of serotonin (0.2–5.0 g./kg. body wt.) induced an initial arousal pattern replaced after 30–150 sec. by a protracted phase of hypersynchrony which lasted often as long as 15 min. Recruiting responses produced by medial thalamic stimulation showed a similar biphasic reaction to serotonin characterized by initial depression followed by often marked and long-lasting enhancement. These electroencephalogram (EEG) changes were accompanied by initial widening then narrowing of the pupils. After transection of the brain stem at the midpontine level, serotonin produced only signs of arousal in the EEG. Intravertebral injections of 5-hydroxytryptamine (5-HT) and injections of 5-HT into the fourth ventricle induced only hypersynchronizing effects. After cauterization of the area postrema or after application of 5-HT blocking agents to the posterior fourth ventricle the hypersynchronizing effects of intracarotid or intravertebral 5-HT were reduced or altogether eliminated. It is concluded that serotonin produces the EEG and ocular signs of synchronized sleep by an action exerted on receptor sites in the area postrema, from which nervous signals travel to the nucleus of the solitary tract and then to more rostrally situated hypnogenic areas.

A66-82291
DEPRESSION OF CALCIUM ABSORPTION IN PARATHYROIDECTOMIZED RATS.
B. G. Shah and H. H. Draper (Ill. U., Dept. of Animal Sci., Div. of Nutr. Biochem., Urbana).
American Journal of Physiology, vol. 211, Oct. 1966, p. 963–966. 18 refs.
Grant PHS AM-07052.

An in vivo study of the effect of parathyroidectomy on the intestinal absorption of Ca by growing rats showed that parathyroidectomy did not appreciably affect net absorption at a dietary level of 1.2%, but that it significantly depressed absorption at levels of 0.6 and 0.3%. This observation is interpreted to mean that the parathyroid hormone is one of the factors involved in the phenomenon of adaptation to changing dietary intake of calcium.

A66-82292
RELATIONSHIP OF MUSCLE PROTEIN TO OTHER COMPONENTS OF THE FAT-FREE MASS.
K. S. K. Chinn and John P. Hannon (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Physiol. Div., Denver, Colo.).
American Journal of Physiology, vol. 211, Oct. 1966, p. 993–997. 8 refs.

The distribution of protein between the skeletal musculature and the remaining tissues of the body and the relationship of these components to the fat-free mass were studied in 70 male rats (39–247 days of age) and 20 female rats (45–108 days of age). The fraction of the body represented by each of these protein compartments was highly correlated not only with the fat-free mass, but also with the water and mineral content. The percentage of the fat-free mass represented by muscle protein increased rapidly between the ages of 39–70 days. Thereafter it remained constant. The combined nonmuscular protein fraction of the fat-free mass was virtually unchanged throughout the life of the animal. In young rats the size of the rapidly increasing muscle fraction was shown to be highly correlated with published data on metabolic rates. This correlation indicates that the rapidly declining metabolic rates observed in young animals are primarily attributable to an equally rapid increase in relative muscle mass.

A66-82293
DYADIC ATTRACTION AND ORIENTATIONAL CONSENSUS.
Gary Moran.
Journal of Personality and Social Psychology, vol. 4, Jul. 1966, p. 94–99. 7 refs.
Mont. U., Computer Center supported research.

The sample consisted of 233 dyads from nine 10–16 man Dutch industrial training groups which met together for 30 hr. Highly and lowly attracted dyads were identified on the basis of members' expressed ability to work together. As hypothesized, highly attracted dyads were characterized by (a) greater mutual communication (.001), and (b) a greater similarity in sources of communication within their groups (.005). Further, such dyads showed higher mutuality in preference for (.001) as well as in assignment of status to fellow group members (.005). High- and low-attraction dyads did not differ in consensus as to the importance of 12 group discussion topics. These findings were interpreted as supporting the attraction-orientation but not the attitude-orientation segment of Newcomb's A–B–X theory as applied to so-called collective systems.

A66-82294
CONCEPTUAL STRUCTURE, COMMUNICATOR IMPORTANCE, AND INTERPERSONAL ATTITUDES TOWARD CONFORMING AND DEVIANT GROUP MEMBERS.
Siegfried Streufert (Rutgers–The State U., Douglass Coll., New Brunswick, N. J.).
Journal of Personality and Social Psychology, vol. 4, Jul. 1966, p. 100–103. 16 refs.
ONR supported research.

The effect of four levels of complexity of conceptual structure on evaluations of deviant and conforming group members was investigated. Evaluations of deviant and conforming group members under four interaction-distance conditions were obtained. Subjects who scored low on measures of complexity were sensitive to deviance and conformity of other group members. They were not sensitive to changes in interaction distance. Subjects who scored moderately low through high on measures of complexity were sensitive to both conformity-deviance and to changes in interaction distance.

A66-82295
PATTERN RECOGNITION: THEORY, EXPERIMENT, COMPUTER SIMULATIONS, AND DYNAMIC MODELS OF FORM PERCEPTION AND DISCOVERY.
Edited by Leonard Uhr (Wis. U., Computer Sci. Dept., Madison). New York, John Wiley and Sons, Inc., 1966, xii+393 p. Many refs. $5.95.

The problem of pattern recognition is considered in terms of the psychological functions of perception and cognition. The detailed background is discussed in terms of experimental reports and some empirical findings. Results and theories of coding and learning shape and pattern perception are presented, followed by discussions of sensory acuity; summation and inhibition in frog retina; excitation, receptive fields, binocular interaction, and functional architecture of cat visual cortex; cerebral memory mechanisms; and computer simulations for pattern recognition.

A66-82296
FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS; Symposium presented at the Fifth Pacific Area National Meeting, American Society for Testing and Materials, Seattle, Wash., Oct. 31–Nov. 5, 1965. (ASTM Special Technical Publication no. 398).
Symposium Cosponsored by NASA and ASTM Comm. E-21 on Space Simulation.
Philadelphia, Am. Soc. for Testing and Materials, 1966, vii+91 p. Many refs.
$8.00; to members $5.60.

The man-rating of a simulated space environmental chamber involves equipment and certification for human occupancy. The seven papers in the volume present information on the need, facility requirements, operational problems, and biomedical and physiological aspects associated with man-rating space chambers. The work limitations when wearing pressurized suits, physiological responses to hypoxia, and physiological data acquisition in pressurized suits are also discussed.

A66-82297
FUNCTIONAL MAN IN SIMULATED SPACE.
A. F. Sullivan (Litton Systems, Inc., Space Sci. Labs., Beverly Hills, Calif.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS:
Philadelphia, Am. Soc. for Testing and Materials, 1966, p. 1–10.

To date, manned operations in space chambers have been restricted to mission testing, and man's unique capabilities have not been usefully employed. Man has not functioned as an *in situ* experimenter or operator because of the well-recognized physiological restrictions imposed by the available space suits. The early "hard-suit" applied the principle of constant volume to obtain mobility in a pressurized joint. This principle has been further refined and embodied in a space suit developed for NASA. With reduced bulk and weight, and mobility approaching that of an unsuited man, this most recent suit permits immediate consideration of useful manned operations. With further development in the direction indicated by this approach, such operations can reasonably be expected to become routine.

A66-82298
PHYSIOLOGICAL RESPONSES TO NEAR-VACUUM.
R. W. Bancroft (School of Aerospace Med., Aerospace Med. Div., Appl. Physiol. Branch, Brooks AFB, Tex.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS.
Philadelphia, Am. Soc. for Testing and Materials, 1966, p. 11–20. 16 refs.

Unanesthetized dogs and trained subhuman primates, including chimpanzees, were decompressed in about 1 sec. from 180 to less than 2 mm. Hg. Exposure times at the low pressure ranged from 5 to 180 sec. for the dogs and up to 150 sec. for the chimpanzees. The animals usually became unconscious in about 9 to 12 sec. after decompression. The effects of anoxia, water vapor, and other evolved gases were apparent, resulting in generalized muscle spasticity, a few gasps, transitory convulsion seizures, apnea, and gross swelling of the body. All dogs exposed for less than 120 sec. survived despite evidence of transient lung damage. Respiration recommenced spontaneously either during or after recompression provided there was sufficient cardiovascular recovery to restore blood pressure, flow, and brain oxygenation. The longer the exposure time, the longer the recovery period, which ranged from a few minutes to a few hours, except for one dog, which showed a severe post-decompression paralysis with gradual recovery over a period of several weeks. In dogs, exposures of 120 to 180 sec. resulted in about 15 to 18% fatalities, respectively. Denitrogenation resulted in a significantly higher survival rate. Evidence of severe pathologic damage, except for the lungs and one case of paralysis, was essentially absent upon autopsy. Chimpanzees exposed for as long as 150 sec. recovered with no apparent nervous system damage.

A66-82299
INSTRUMENTATION AND DATA ACQUISITION FOR PRESSURE-SUITED TEST SUBJECTS IN SPACE ENVIRONMENT SIMULATION TESTING.
E. C. Wortz (Garrett Corp., AiRes. Manuf. Co., Life Sci. Dept., Los Angeles, Calif.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS.
Philadelphia, Am. Soc. for Testing and Materials, 1966, p. 21–42.

Instrumentation is described for making the following measurements on a pressure-suited subject: partial pressures of inspired gases (oxygen, carbon dioxide), electrocardiogram, respiration rate and depth, blood pressure, body core temperature, metabolic rate, and skin temperature. Acceptable limits for some of these are given.

A66-82300
MAN-RATING PROVISIONS OF THE BOEING 40- BY 50-FOOT SPACE CHAMBER.
John VanBronkhorst and J. W. Yerkes (Boeing Co., Aero-Space Group, Space Environ. Simulation Lab., Seattle, Wash.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS.
Philadelphia, Am. Soc. for Testing and Materials, 1966, p. 43–52.

The man-rating features of the 40-foot diameter by 50-foot space environment chamber at The Boeing Co. facility in Kent, Wash., are described. This chamber was designed to allow the testing of large, manned, pressurized spacecraft in real-time simulation of earth-orbiting and deep-space missions. Key features pertaining to manned occupancy, including structural design, pumping systems, repressurization systems, controls, monitoring and rescue provisions, and biomedical training and treatment are described.

A66-82301
MANNED OPERATIONS IN THE NASA MSC LOW-PRESSURE CHAMBERS.
J. H. Chappee, R. R. Hessberg, and W. R. Hawkins (NASA, Manned Spacecraft Center, Houston, Tex.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS.
Philadelphia, Am. Soc. for Testing and Materials, 1966, p. 53–61.

Two low-pressure chambers were described, the Crew Systems Division (CSD) and the Structures and Mechanics Division (SMD) of the National Aeronautics and Space Administration Manned Spacecraft Center at Houston, Texas. A brief description of the facilities and their status and of anticipated tests is presented to aid in acquiring an understanding of the man-rating philosophy and procedures utilized. The qualification for manned operations includes the philosophy of manned testing, adequate detailed procedures for operation, assurance of reliability of personnel equipment, appropriate medical surveillance techniques, and a qualified facility. The important factor in manned participation in chamber testing appears to be the achievement of complete cooperation and coordination of the engineering and medical disciplines in establishing and maintaining high standards for maximum safety of operation.

A66-82302
MAN-RATING THE DOUGLAS 39-FOOT-DIAMETER SPACE SIMULATOR.
J. T. Morrow (Douglas Aircraft Co., Missile and Space Systems Div., Space Simulation Lab., Huntington Beach, Calif.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS.
Philadelphia, Am. Soc. for Testing and Materials, 1966, p. 62–68.

The Douglas space simulator is a 39-foot-diameter sphere with a pumping speed adequate for manned operation while maintaining a simulated space vacuum. Man-rating of the simulator will permit personnel safely to occupy the chamber and to enter or leave it quickly. The simulator will be modified to provide a two-stage repressurization system, additional penetrations for life-support systems, and a two-compartment air lock. The primary and secondary air locks will be used to enter the chamber without breaking vacuum and as a backup chamber for observer and rescue personnel. The primary lock may also be used as an independent test chamber. A life-

support system will be provided to support personnel inside the chamber and locks. Suitable biomedical monitoring of chamber occupants will be provided.

A66-82303
RAPID REPRESSURIZATION OF SPACE SIMULATION CHAMBERS.
J. H. Jones, R. J. Berman (Gen. Elec. Co., King of Prussia, Pa.), and B. Weichbrodt (Gen. Elec. Co., Res. and Develop. Center, Schenectady, N. Y.).
IN: FACTORS IN THE OPERATION OF MANNED SPACE CHAMBERS.
Philadelphia, Am. Soc. for Testing and Materials, 1966, p. 69–91. 9 refs.
Contract AF-04(600)-1012.

In space simulation studies, an emergency recompression system is necessary to insure a sufficient supply of oxygen and pressure in cases where a space suit becomes depressurized. Trouble-free, rapid repressurization of space simulation chambers is possible using a commercially available muffler. Expected adverse dynamic and acoustic phenomena were eliminated during chamber tests. Heat transfer during the repressurization period was by forced convection; after the repressurization it was primarily by free convection. Fogging occurred during ambient air repressurization when the cryowall was cold. An open-cycle fan heater should eliminate the fog.

A66-82304
EXTRATERRESTRIAL LIFE: AN ANTHOLOGY AND BIBLIOGRAPHY.
Washington, D. C., Natl. Acad. of Sci., Natl. Res. Council, Publ. 1296A, vii + 478 p. Many refs.
$6.00.

An anthology of 23 selected textbook and journal articles on the subject of origin, composition, and organic syntheses of extraterrestrial life is presented in the first part of the volume. The second part contains 11 papers on Mariner IV and sounding rocket observations of Mars which were made in 1965. The third part, the bibliography, contains over 2000 references to world literature published through 1965.

A66-82305
UREA TRANSFER ACROSS THE SWEAT GLANDS.
Gregory K. Komives, Sid Robinson, and James T. Roberts (Ind. U., Dept. of Anat. and Physiol., Bloomington).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1681–1684. 12 refs.
Grant DA-MEDDH-60-10.

A study was made of the concentrations of urea in sweat and plasma of men working (MR 190 kcal./m^2 per hr.) in dry heat (46°C DB; 26°C WB) for periods of three–five hr. Hourly sweat rates of the men were measured as net weight loss and analyses were made on the sweat residue washed from the skin at the end of each hour. During prolonged exposures the sweat-plasma urea ratio averaged 1.5 in the first hr. and declined to about 1.0 in the second and subsequent hours. The sweat–plasma urea ratio of the men was unaffected (a) by fourfold increments of plasma urea produced by ingestion of urea, (b) by twofold variations of sweat rate, or (c) by reduction of sweat chloride from 50 to 15 mEq./liter during a six-day period in which the men were maintained in a state of moderate salt deficiency. Thus, after the first hr. of prolonged exposures in which the skin was functioning under normal atmospheric conditions, sweat urea appeared to arise from the extracellular fluid by a process of passive diffusion across the sweat glands. Water resorption within the sweat glands appears unlikely.

A66-82306
ELECTROMYOGRAPHY OF THE GENIOGLOSSUS MUSCLES IN MAN.
Charles T. Bole II and Milton A. Lessler (Ohio State U., Depts. of Orthodontics and Physiol., Columbus).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1695–1698. 14 refs.
Grant NIDR 5-F2-DE-20.

Electromyographic recordings of integrated electrical activity from the genioglossus muscles of the tongue were made with intramuscular electrodes. The genioglossi tended to act together during lateral as well as forward movements of the tongue with the greatest electrical activity being observed when the tongue met resistance. There was little or no electrical activity recorded when the subject was speaking the words four, five, six, and seven. The greatest activity was observed when the subject was speaking the words three, eight, and nine which involve the consonants t, th, and n. These sounds involve placing the tongue against the teeth or the lingual alveolar process.

A66-82307
SODIUM AND WATER EXCRETION AND RENAL HEMODYNAMICS DURING LOWER BODY NEGATIVE PRESSURE.
Charles A. Gilbert, Lee A. Bricker, W. Thaxton Springfield, Jr., Paul M. Stevens, and Bruce H. Warren (School of Aerospace Med., Aerospace Med. Sci. Div., Internal Med. and Biodyn. Branches, Brooks AFB, Tex.)
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1699–1704. 31 refs.

Zero gravity conditions such as occur in orbital space flight are known to produce significant losses of body fluids and electrolytes. Lower body negative pressure (LBNP) applied to the supine subject has been suggested as a possible preventive measure. The present study demonstrated that 60 mm. Hg LBNP applied for one hr. produced moderate declines in glomerular filtration rate, renal plasma flow, and tubular reabsorption of sodium, with marked falls in rate of urine flow, free water clearance, and sodium excretion. Although antidiuretic hormone and salt-retaining hormones may have played a role in the responses seen, the changes which occurred in sodium and water excretion appear explainable primarily on the basis of diminished glomerular filtration rate. It is concluded that LBNP is a potent stimulus to retention of salt and water and therefore has a potentially valuable place in maintaining or restoring plasma volume during prolonged weightlessness.

A66-82308
RENIN ACTIVITY DURING SUPINE EXERCISE IN NORMOTENSIVES AND HYPERTENSIVES.
Alfred F. Fasola, B. L. Martz, and Oscar M. Helmer (Ind. U., School of Med., Dept. of Med. and Marion County Gen. Hosp., Sunnyside Guild Pulmonary Function Lab., Lilly Lab. for Clin. Res., Indianapolis).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1709–1712. 23 refs.

Renin activity and renin substrate were studied at rest and during exhaustive supine exercise in 12 normotensives and 17 patients with mild-to-moderate systemic hypertension. Of 12 normotensives, 11 showed an increase in renin activity

with exercise and four showed a further elevation 20 min. after exercise. Though some hypertensives showed an increase, the majority showed no activity or a decrease with exercise. Renin activity showed greater suppression in Negro than in white hypertensives, possibly related to genetic and dietary factors. Renin substrate was significantly higher in hypertensives. These data indicate that renin release plays a role in the normal homeostatic mechanism geared to physical activity and position.

A66-82309
CARDIOPULMONARY EFFECTS OF BRIEF, INTENSE THERMAL EXPOSURES.
Raymond H. Murray (Ind. U., Cardiopulmonary Lab., Wright-Patterson AFB, Ohio).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1717–1724. 71 refs.
Contract AF 33(616)8378.

To evaluate the cardiovascular and respiratory effects of brief, intense heat stress, six clothed human subjects were exposed to two 20-min. thermal pulses (reaching 150 and 205°C.) with indwelling arterial and venous catheters and an expired-air collection system; wall temperatures rose 28°C./min. The 205°C. exposures approached tolerance limits; average skin temperatures reached 42.5°C., rectal temperatures rose 0.5°C., sweat rate exceeded 1 liter/hr., and weakness and presyncopal symptoms were common. Heart rate and cardiac output rose to peak levels quickly, followed by progressive increase in systolic blood pressure, systolic ejection rate, and central venous pressure values, as circulation time, diastolic blood pressure, and systemic vascular resistance fell gradually. Estimated plasma volume fell approximately 8%. Respiratory rate remained unchanged, while tidal volume rose along with arterial oxygen content and pH as carbon dioxide content fell; oxygen consumption rose slightly. Two subjects bled into subcutaneous tissues at catheterization sites 4–6 hr. after the exposures.

A66-82310
CARDIOPULMONARY EFFECTS OF WHOLE-BODY VIBRATION IN MAN.
William B. Hood, Jr., Raymond H. Murray, Charles W. Urschel, John A. Bowers, and James G. Clark (AF Systems Command, Aerospace Med. Div., Aerospace Med. Res. Labs., Biophys. Lab., Multienviron. Div., Environ. Stress Branch and Ind. U., Cardiopulmonary Lab., Wright-Patterson AFB, Ohio).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1725–1731. 31 refs.

Supine whole-body x-axis sinusoidal vibration in four human volunteers produced increases in mean arterial blood pressure, heart rate, cardiac output, oxygen consumption, and minute volume of ventilation. These physiologic effects were more marked at 1.2 g peak acceleration than at 0.6 g and at 8 and 10 c.p.s. than at frequencies to either side of this range. The changes observed were similar to those produced either by passive movement of the relaxed extremities or by mild muscular exertion. It is postulated that whole body vibration elicits these changes by relfex stimulation of muscular contraction, and that such a mechanism may play a role in producing the physiologic effects of active muscular exercise.

A66-82311
ENERGY METABOLISM AT HIGH ALTITUDE (3,475 M).
C. Frank Consolazio, Richard A. Nelson, Le Roy O. Matoush, and James E. Hansen (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Denver, Colo.)
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1723–1740. 19 refs.

Maximal work capacity (V_{O2}) on the bicycle ergometer at 3,475 m. was measured in one group of men acclimated to sea level, and two groups acclimated to 1,610 m. At 3,475 m., maximal V_{O_2} in milliliters per kilogram body weight per minute was reduced by 17% for the sea level group, and by 10% for the group from 1,610 m. Although there was a difference of approximately 7% in V_{O_2} between sea level and 1,610 m. groups, there was no measurable beneficial effect of acclimatization at 1,610 m. in improving maximal work at 3,475 m. Maximal work capacity and maximal V_{O_2} did not improve over a 20-day period at altitude. Ventilation (Ve) STPD was decreased, and Ve BTPS increased on arrival at altitude with a gradual increase in both during prolonged exposure. Pulse rates at rest, and moderate exercise, were consistently high at high altitudes, whereas the maximal pulse rates gradually declined. Oxygen consumption at the basal, sitting rest, and moderate exercise states was not markedly changed by altitude. The physiological cause for the cessation of maximal work at altitude remains obscure. Under the conditions of this study, (a) the 1,610-m. elevation did not seem to be beneficial in improving the maximal work at 3,475 m.; (b) a 20-day acclimatization period at 3,475 m. did not result in a superior submaximal or maximal work performance on return to sea level; and (c) individuals can adequately perform submaximal work even after the initial high-altitude exposure.

A66-82312
ALTERATIONS IN BODY COMPOSITION IN MAN AFTER ACUTE EXPOSURE TO HIGH ALTITUDE.
Martin I. Surks, Kenneth S. K. Chinn, and Le Roy O. Matoush (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Physiol. and Bioenergetics Divs., Denver, Colo.)
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1741–1746. 16 refs.

Body composition was measured in five young males, residents of Denver, Colorado (5,280 ft. altitude) before, during, and after eight days on the summit of Pikes Peak, Colorado (14,100 ft. altitude). Body weight progressively decreased during the altitude period resulting primarily from a decrease in body fat as estimated by measurements of body density, creatinine excretion, and total body potassium (K) (from K^{40} counting). No changes were observed in total body water (W), lean body mass, protoplasmic mass (M_3), and bone mineral, all of which were derived from the same measurements. Although M_3 was unchanged, calculations based on creatinine excretion and K showed an increase in non-muscle protein at the expense of muscle protein. Attempts to measure W directly, employing deuterium oxide dilution, were unsuccessful possibly due to uneven distribution of this isotope in the body water compartments at high altitude. A highly significant decrease ($P<0.001$) in plasma volume after four and eight days at altitude provided direct evidence for altered water distribution in this environment.

A66-82313
EFFECT OF LOOSENESS OF SNOW ON ENERGY EXPENDITURE IN MARCHING ON SNOW-COVERED GROUND.
S. S. Ramaswamy, G. L. Dua, V. K. Raizada, G. P. Dimri, K. R. Viswanathan, J. Madhaviah, and T. N. Srivastava (Defence Res. Lab., Landour, Mussoorie, India).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1747–1749.

The caloric requirements of walking on loose deep snow were determined in 12 young soldiers at an altitude of 2,270 m. in North India. Oxygen requirements increased linearly with the depth of the snow until the imprints of the feet reached a depth of 37 cm. The oxygen requirements (in liters) for a 60-kg. man covering the distance of 1 km. was found to be expressed by the equation: $Y = 9.0 + 1.27\ X^{1.038}$, where X stands for the depth (in cm.) of the foot impression. When the latter exceeded 37 cm., the oxygen requirements seemed to rise asymptotically in spite of the fact that the walking speed was slowed up by the increasing depth of snow. This was explained as a consequence of the enormous increase in the swinging movements of the body. The respiratory stress during walking on loose snow was comparable to that experienced when running on snow-free ground at 8 km./hr. or marching with a 70-lb. load at 6 km./hr.

A66-82314
REPEATED SERIAL DETERMINATION OF CARDIAC OUTPUT DURING 30 MIN EXERCISE.

Gunnar Grimby, Nils Johan Nilsson, and Harold Sanne (Göteborg U., Dept. of Clin. Physiol., Sweden).

Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1750–1756. 26 refs.

Swed. Sport Assn. and Swed. Natl. Assn. against Heart and Lung Diseases supported research.

Cardiac output was determined with the dye-dilution technique at rest supine, sitting, and during 30 min. exercise at 600 or 900 kpm/min. on a bicycle ergometer. Cardiac output and stroke volume were lower at rest in the sitting than in the supine position and increased considerably during the first seven min.; it was then fairly stable at both work loads, with a mean variation coefficient of 6.2%. The stroke volume fell slightly after seven min. of work. Bandaging the legs increased the stroke volume at rest and during exercise in the sitting position. The effect of previous exercise was analyzed at two work tests two hr. apart. The heart rate was significantly higher at rest and during exercise at the second examination but the cardiac output did not change significantly.

A66-82315
ESOPHAGEAL, RECTAL, AND MUSCLE TEMPERATURE DURING EXERCISE.

Bengt Saltin and Lars Hermansen (Kungliga Gymnastika Centralinst., Dept. of Physiol., Stockholm, Sweden).

Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1757–1762. 16 refs.

Swed. Med. Res. Council, Förenade Liv. (United Life Group Insurance Co.), and Swed. Sports Federation supported research.

Esophageal, rectal, and muscle temperatures were measured during submaximal work of one hr. duration in five males and two females with large differences in maximal oxygen uptake. Average oxygen uptake on the three sub-maximal work loads were 1.07, 2.09, and 2.98 liters/min., corresponding to 26, 51, and 69% of the maximal oxygen uptake. The esophageal temperature was, at the three work loads, 37.29±0.08, 38.01±0.04, and 38.49±0.10°C., respectively. The rectal and the quadriceps temperatures were higher at the end of each work periods, by 0.14°C. and 0.70°C., respectively, than the corresponding esophageal temperatures. The core temperature and the temperature in the working muscle was set according to the relative work load of the individual and not to the absolute work load performed. Skin and esophageal temperatures and sweating rates were recorded in two subjects exercising on a 52% work load, respectively, in the same environment. The weighted mean skin temperature and the esophageal temperature were identical in the two subjects during work. The sweating rate was related to the external work load performed.

A66-82316
ENERGY COST OF LEG KICK, ARM STROKE, AND WHOLE CRAWL STROKE.

Marlene J. Adrian, Mohan Singh, and Peter V. Karpovich (Springfield Coll., Physiol. Res. Lab., Mass.).

Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1763–1766. 12 refs.

Grant NIAMD AM 06724-03.

The net energy costs of the leg kick, arm stroke, and whole stroke of the crawl were determined and formulas for the calculation of oxygen requirement were derived. For a given speed the energy cost of the leg kick was two to four times greater than that of the arm stroke and whole stroke. The energy cost of the arm stroke was less than that of the whole stroke up to a velocity of 3.35 ft./sec. The formulas for oxygen consumed per minute derived from tests on the best swimmer are: $\dot{O}_2$ for the legs $= 1.32\ V^{2.05}$; $\dot{O}_2$ for the arms $= V^{3.95}/20.42$; and $\dot{O}_2$ for the whole stroke $= V^{2.70}/4.38$ (V = velocity, ft. sec.). The energy cost given here pertains to actual swimming and not to conventional swimming which consists not only of swimming but of a dive and push-offs which inflate the so-called average velocity. The efficiency of the leg kick ranged from .05–1.23%, whereas the arm stroke ranged from .56–6.92%. The efficiency of the whole stroke was slightly higher than that reported in other studies and ranged from 1.71–3.99%. Results obtained substantiate opinions of swimming coaches that in long-distance crawl swimming the leg action should be reduced to a minimum.

A66-82317
EFFECTS OF AEROBIC WORK PERFORMED DURING RECOVERY FROM EXHAUSTING WORK.

C. Gisolfi, S. Robinson, and E. S. Turrell (Ind. U., Dept. of Anat. and Physiol., Bloomington).

Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1767–1772. 16 refs.

NASA Grant NSG 408.

The oxygen debt and the rate of lactate removal were determined in four physically fit men during recovery following exhausting runs on the treadmill. In one type of experiment the subjects rested throughout recovery, while in another they performed aerobic work for 35 or 50 min. immediately following the exhausting run and then rested. The results include a reduction of one to two liters in the oxygen debt and a substantial increase in the rate of lactate removal when aerobic work was performed during recovery following exhausting work as compared with values observed when the subjects rested during recovery. It is also significant that, following payment of the lactacid oxygen debt, the rate of removal of the respiratory oxygen debt per gram of lactate removed was different at different stages of recovery. The data suggest that a greater fraction of the lactate may have been utilized as fuel during the exercising recovery so that the proportion of lactate resynthesized to glycogen would be reduced and this would presumably reduce the oxygen debt.

A66-82318
SPLANCHNIC REMOVAL OF LACTATE AND PYRUVATE DURING PROLONGED EXERCISE IN MAN.

Loring B. Rowell, Kenneth K. Kraning II, Thomas O. Evans, J. Ward Kennedy, J. R. Blackmon, and Fusako Kusumi (Wash. U., School of Med., Div. of Cardiol., Dept. of Med., Seattle).
(Fed. of Am. Soc. for Exptl. Biol., Ann. Meeting, Atlantic City, Apr. 1966).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1773–1783. 46 refs.
Grants NHI HE-9773, HTS-5147, HE-4281 and NIH FR-37.

To determine the time course of hepatic–splanchnic lactate and pyruvate uptake during exercise, estimated hepatic blood flow (EHBD) was determined in six normal men by constant infusion of indocyanine green during prolonged (60–70 min.) treadmill exercise requiring 48–70% of maximum VO_2. Arterial and hepatic venous lactate and pyruvate concentrations peaked by the 10th min. of exercise and decreased thereafter ($t^{1}/_{2}$=22–33 min.). EHBF was reduced 50–70%; nevertheless, splanchnic VO_2 increased with time while splanchnic lactate uptake averaged 0.77±2.5% of estimated total body lactate per min., or 46% of the lactate removed in 60 min. Splanchnic CO_2 production could account for oxidation of only a small fraction of lactate removed by this region, making gluconeogenesis a likely major pathway. Arterial lactate/pyruvate ratios and "excess" lactate decreased with time while hepatic venous values increased. During milder exercise one man showed proportionally smaller splanchnic lactate removal rate. We conclude that the lactate–oxygen debt relationship during exercise is time dependent while oxygen debt is not.

A66-82319
HEAT STRESS AND SPERMATOGENESIS IN BOS INDICUS AND BOS TAURUS CATTLE.

J. D. Skinner and G. N. Louw (Pretoria U., Dept. of Animal Sci., South Africa).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1784–1790. 17 refs.

A series of experiments was carried out to determine the critical duration of high ambient temperature (40°C.) required to affect spermatogenesis adversely in the bovine. The comparative reaction of *Bos indicus* and *Bos taurus* breeds was studied as well as the site and nature of the damage to the spermatogenic cycle. Spermatogenesis in the *Bos indicus* breed was not as severly affected as in *Bos taurus,* but optimum spermatogenesis was impaired in both breeds. An exposure period of as little as 12 hr. was critical and the site of virtually all damage was established as being in the seminiferous tubules. Spermatids exhibited vacuolation; this was the stage in the cycle apparently most severely affected by a temperature of 40° C. Moreover, a significant decrease in motility and percentage of live spermatozoa was recorded together with a significant increase in the percentage of morphologically abnormal spermatozoa. It is concluded that even short-term exposure to heat stress can affect spermatogenesis and fertility adversely in the bovine.

A66-82320
EFFECT OF CENTRAL COOLING IN MAN ON PITUITARY–THYROID FUNCTION AND GROWTH HORMONE SECRETION.

Gerald R. Berg, Robert D. Utiger, Don S. Schalch, and Seymour Reichlin (Rochester U., School of Med. and Dentistry, Dept. of Med., N. Y. and Washington U., School of Med., Dept. of Med., St. Louis, Mo.)
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1791–1794. 19 refs.
Grants PHS NB 04051, AM 08630, and AM 08943.

In order to determine if central cooling in the human leads to activation of the pituitary–thyroid axis, as has been demonstrated in goats and rats, studies were carried out of pituitary–thyroid function in normal humans following the ingestion of 400 g. of cracked ice. The subjects were maintained at thermal neutrality to prevent skin thermoreceptor activation. In six normal men, tympanic membrane temperature fell about 0.5°C. and returned to normal by 60 min. Oxygen consumption measured by spirometry rose in four of the six subjects, but the mean change for the group was not significant statistically. Plasma thyroid-stimulating hormone (TSH) measured by radioimmunoassay was not altered by central cooling, and the slight changes in plasma protein-bound iodine which were observed were attributable to changes in hemoconcentration. Plasma growth hormone levels were also determined because of the recent demonstration that a variety of stressful stimuli increase growth hormone secretion, but this hormone also was unaffected by ice ingestion. It is concluded that a brief period of central cooling in man brings about a prompt increase in oxygen consumption in some individuals. No significant activation of the pituitary–thyroid axis or of growth hormone secretion was observed under the conditions of this experiment.

A66-82321
EFFECT OF AMBIENT TEMPERATURE UPON EMOTIONAL HYPERTHERMIA AND HYPOTHERMIA IN RABBITS.

Yasuo Yokoi (Tokyo U., Fac. of Med., Dept. of Pharmacol., Japan).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1795–1798. 16 refs.

Ambient temperature was a predominant factor determining thermal response of a rabbit subjected to a change of restraint. The hyperthermia and hypothermia thus produced can be interpreted as psychogenic but are not readily explained from the changes in cutaneous blood flow.

A66-82322
PARTITIONAL CALORIMETRIC STUDIES OF MAN DURING EXPOSURES TO THERMAL TRANSIENTS.

J. D. Hardy and J. A. J. Stolwijk (Yale U., School of Med., Dept. of Physiol. and John B. Pierce Found. Lab., New Haven, Conn.)
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1799–1806. 10 refs.
Contract DA-49-193-MD-2373.

Three young men dressed in shorts were exposed for one hr. at a neutral temperature of 28°C., then quickly transferred for a two-hr. exposure at 22 or at 18°C., following by another hour at 28°C. Similar transfers were made between 18 and 22°C., and 43°C. The effect of a four-hr. exposure at 18 and at 13° C, was also studied. Tympanic membrane temperature, rectal and average skin temperature, metabolic rate, and evaporative heat loss were measured. Heat balances were made for each 5-min. period by partitional calorimetry. During exposures to air temperatures of 43°C. (sweat freely evaporated) the total increase in body heat content was limited to less than 30 kcal./m. In the cold (13–18° C.) net heat loss continued at the rate of 20–40 kcal./m. per hr. even at the end of a two-hr. exposure when the body heat content had already decreased by 100 kcal./m. Shivering was not observed at 18°C. after two hr. Sweating occurred if the average skin temperature was above 33.5°C. and the tympanic membrane temperature was above 36.6°C. at the same time. Evaporative heat loss during the thermal transients and the steady state

could be accounted for by the product, [70 $(T_{skin}-33.5)\times$ $(T_{ear}-36.6]$ kcal./m.^{2} per hr. if both terms are positive.

A66-82323
ALVEOLAR-ARTERIAL GAS EXCHANGE DURING MUSCULAR WORK IN OBESITY.
J. A. Dempsey, W. Reddan, J. Rankin, and B. Balke (Wis. U., U. Hosp., Pulmonary Function Lab., Madison).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1807–1814. 45 refs.
Grants NIH HE 07474-03 and Ti HE 5626-03.

Various aspects of alveolar-arterial gas exchange in 13 obese (110–190 kg., 31–50% body fat) and 13 normal, healthy, sedentary young adults were compared at rest, at moderate and severe levels of steady-state work at similar metabolic rates, and at "maximum" work intensities. The majority of obese subjects were capable of meeting the rising requirement for CO_2 elimination during moderate, severe, and all-out work. In only 1 of 13 cases was the work of breathing elevated or sensitivity to respiratory stimuli reduced to such an extent that pulmonary ventilation was depressed and hypercapnia resulted. Alveloar-to-arterial O_2 transport was limited in varying degrees, and measured values of steady-state diffusion of CO were consistently reduced in the majority of obese subjects during moderate and severe levels of work. It was proposed that the basic disorder in O_2 and CO exchange in obesity was one of nonuniform ventilation distribution with reduction in the effective alveolar-capillary interface.

A66-82324
WORK CAPACITY DETERMINANTS AND PHYSIOLOGIC COST OF WEIGHT-SUPPORTED WORK IN OBESITY.
J. A. Dempsey, W. Reddan, B. Balke, and J. Rankin (Wis. U., U. Hosp., Pulmonary Function Lab., Madison).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1815–1820. 25 refs.
Grant NIH HE 0747-03.

Selected cardiopulmonary responses of 14 obese and 14 normal, healthy, sedentary males were compared with specific reference to: (a) the "physiological cost" of performing identical intensities of external work on the bicycle ergometer; and (b) the capacity of the oxygen transport systems during "maximal" work. The obese subject's energy expenditure per unit of work load on the bicycle ergometer was markedly increased. The greater "relative intensity" of moderate work in the obese was reflected in a higher level of anaerobic work, elevated blood pressure, heart rate, and pulmonary ventilation, and an exaggerated alveolar-arterial PO_2 difference. The maximum quantity of oxidative energy available for muscular work was severely reduced in obesity. Excessive fatness contributed to this decrement in work capacity directly, through its presence an an inert, noncontributory load, and indirectly, through its apparent interference with over-all maximum circulatory–respiratory function. Interferences with alveolar-arterial exchange of O_2 or CO_2 during moderate and severe work was not of sufficient magnitude to warrant the implication of ineffective pulmonary function as a major limitation to maximum oxygen transport in the majority of obese subjects.

A66-82325
EFFECT OF GAS COMPRESSION ON PULMONARY PRESSURE, FLOW, AND VOLUME RELATIONSHIP.
Roland H. Ingram, Jr. and Donald P. Schilder (West Haven Veterans Admin. Hosp., Pulmonary Lab. and Yale U., School of Med., New Haven, Conn.).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1821–1826. 14 refs.

The time course of lung volume change ($\triangle V_L$) due to compression and displacement of gas as measured plethysmographically was simultaneously related to the time courses of expired volume (ΔV), transpulmonary pressure (P) and flow (F) during vital capacities (VC) of varying effort in five normal subjects and ten patients with obstructive airway disease. Isovolume PF relationships based on ΔV and ΔV_L were compared, as were F versus ΔV and F versus ΔV_L curves. Over the lower 75% of the expiratory VC at higher pressures, flow was greater for a given ΔF_L than ΔV. High pressure by compressing gas decreases lung volume more than ΔV indicates. On isovolume ΔV_L PF curves maxima were poorly defined, as contrasted with isovolume ΔV PF curves. These differences were reflected in F versus $\triangle V_L$ and F versus ΔV curves. Large lung volumes and high airway resistance in patients with obstructive airway disease magnified these differences. PF relationships at a constant lung volume can only be obtained plethysmographically.

A66-82326
DEFORMATION OF THE CHEST WALL DURING BREATHING EFFORTS.
Emilio Agostoni and Piero Mognoni (Milan U., Ist. di Fisiol. Umana, Italy).
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1827–1832. 7 refs.
Contract AF 61(052)-867 and Ital. Res. Council supported research.

The deformation of the chest wall during static respiratory efforts and during different pattern of breathing cycles were studied by measuring the dorsoventral and lateral diameters of the rib cage. During inspiratory efforts the horizontal section of the rib cage becomes more elliptical, whereas during expiratory efforts it becomes more circular. During hyperventilation or breathing through resistances the change of the dorsoventral diameter lags behind that of the lateral one and that of the lung volume. The phase shift increases as the load increases. Hence the force of the respiratory muscles acts mainly on the lateral part of the rib cage, whereas the frontal part is mainly driven by the pressure across it and by the movement of the lateral parts. The deformation occurring under load implies theoretically that: (a) some muscles lengthen instead of shortening and vice-versa; (b) information from muscle, joint, and lung receptors are out of phase; and (c) the work of breathing is slightly larger than that calculated on the volume-pressure diagram.

A66-82327
BREATHING UNDER HIGH AMBIENT PRESSURE.
George P. Lord, George F. Bond, and Karl E. Schaefer (U.S. Naval Med. Res. Lab., Submarine Base, Groton, Conn.)
Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1833–1838. 21 refs.
NASA Grant R-24, Control HS-814 and U.S. Navy Bur. of Med. and Surg. Allotment 80049.

The acute effect of high ambient pressure on expiratory airflow was studied in healthy adult males in the ambient pressure range from 1.0 to 7.0 atmospheres absolute pressure (Ata) using a hyperbaric chamber. Changes in flow were assessed with the maximum expiratory flow-volume curve.

The decrease in flow was compared to that occurring in dense high molecular weight gas mixtures. In addition, expiratory gas flow was studied in three men during 12 days at 7.0 Ata in 90% helium. The findings demonstrate that: (1) high ambient pressure and high molecular weight gas of equal density produce similar changes in expiratory flow; (2) in the pressure range from 1.0 to 4.0 Ata in air the greatest decrease in maximum expiratory flow occurs at high lung volumes, while from 4.0 to 7.0 Ata the greatest flow change occurs at low lung volumes; (3) the long-term changes in expiratory flow in high-pressure helium can be explained by the change in physical properties of the breathing mixture; and (4) there are no clincially apparent untoward effects from prolonged high-pressure helium breathing.

A66-82328
AN INEXPENSIVE FLOATING-MESH ELECTRODE FOR EKG RECORDING DURING EXERCISE.

Douglas C. Burns and Philip D. Gollnick (Wash. State U., Dept. of Phys. Educ. for Men, Res. Lab., Pullman).

Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1889–1891. 8 refs.

An electrode suitable for recording an interpretable electrocardiogram (EKG) from a man performing heavy exercise is described. The electrode is inexpensive, easily constructed, and its mechanical and electrical characteristics permit EKG recording without filtering or signal modification. Electrode data are given and sample tracings are presented.

A66-82329
EVALUATION OF A COMPUTER SOLUTION OF EXPONENTIAL DECAY OR WASHOUT CURVES.

Robert G. Rossing (School of Aerospace Med., Biometrics Branch, Brooks AFB, Tex.)

Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1907–1910. 13 refs.

A program was developed for a digital computer which permits solution for the parameters: fraction of total expired air from compartment, alveolar dilution ratio of compartment, and an asymptote toward which the curve is descending in the mathematical model. The program is in two sections. The first provides preliminary estimates of the parameters; the second refines the estimates so as to minimize the mean squared error ratio (MSR). Preliminary estimates from other sources may also be revised by the second portion of the program. Results are reported from the analysis, using this program, of 20 nitrogen washout curves obtained in dogs with and without induced lung disease. The parameter estimates were quite satisfactory and the MSR's were within the limits of the experimental error.

A66-82330
VOLUNTARY CONTROL OF THE DIAPHRAGM IN ONE SUBJECT.

Luisa C. Stigol and Alfredo C. Cuello (Centro de Rehabil. Respirat., Buenos Aires, Argentina).

Journal of Applied Physiology, vol. 21, Nov. 1966, p. 1911–1912.

Control of the diaphragm was studied in three highly trained physiotherapists, three untrained men, and two untrained women while sitting or supine. Two breathing patterns were used. In one, the physiotherapists attempted to enlarge the rib cage while maintaining the abdomen quiet. When diaphragmatic breathing was attempted, they tried to fix the thorax and allow the upper abdomen to protrude during inspiration. Intraesophageal and intragastric pressures were measured with rubber balloons 12 and 10 cm. long, respectively, and 0.5 cm. in diameter. Electromyograms of the abdominal muscles in the three trained subjects were obtained and electrical activity was readily detected during hyperventilation or active expiration produced voluntarily. It was observed that one trained subject was able to inspire voluntarily without contracting his diaphragm. None of the other subjects was able to inspire actively without increasing transdiaphragmatic pressure.

A66-82331
EFFECT OF STIMULUS DESIGN, ROTATION SPEED, AND EXPOSURE ON THE PERCEPTION OF THE SPIRAL AFTER-EFFECT.

Paul L. Thomas and Paschal N. Strong, Jr. (Tex. Technol. Coll., Dept. of Psychol., Lubbock).

Nature, vol. 212, Oct. 1, 1966, p. 51-52. 8 refs.

An investigation of the effects and interactions of rotation speed, spiral design, and number of presentations over time on the strength of the movement after-effect is presented. Four inspection stimuli (single spiral 0.25 in. wide, single spiral 0.5 in. wide, two concentric spirals 0.25 in. wide, and two concentric spirals 0.5 in. wide) were used. Three speeds of rotation (25, 75, and 200 r.p.m.) were also used. Twelve female undergraduates between 18 and 25 years were the subjects. Increasing the number of spirals was a more potent stimulus than increasing speed. Going from one to two 0.5 in. spirals at 25 r.p.m. increased the after-effect from 1.97 in. to 3.08 in. per min. Rotating a single spiral to 75 r.p.m. increased the after-effect to only 3.01 in. per min. The decrement in the strength of the spiral after-effect test between sessions was a striking phenomenon and was shown by every subject. Since the 48-hr. interval between sessions rules out fatigue or satiation, this effect must be explained in terms of central inhibition.

A66-82332
PRISM AFTER-EFFECTS: IDENTICAL RESULTS FOR VISUAL TARGETS AND UNEXPOSED LIMB.

B. Craske and S. J. Gregg (Durham U., Dept. of Psychol., Great Britain).

Nature, vol. 212, Oct. 1, 1966, p. 104–105. 6 refs.

In an earlier investigation, the accuracy with which visual targets and targets such as the unexposed limb, the position of which was not visually derived, was known following adaptation to prisms was found to be significantly different at the 0.001 level for t. Such a result constitutes a severe criticism of any mechanism put forward to explain prism adaptation which is based on change in felt position of the limb. This experiment was repeated because the latter results differed substantially from those of other investigators. However, certain controls and a different training technique were employed. The results obtained are fully in accord with the hypothesis that adaptation to prisms can be explained by a change in transfer function associated with output in position receptors in the shoulder joint. It is suggested that the discrepancy between these latter results and that of the former ones might have been caused by some part of the experimental procedure in which the position sense of the eyes and the prisms was involved. If this occurred, the apparent position of visual targets would have been affected more than the position of the targets which were located without the mediation of vision.

A66-82333
A TACTILE POGGENDORFF ILLUSION.
Gerald H. Fisher (Newcastle upon Tyne U., Dept. of Psychol., Great Britain).
Nature, vol. 212, Oct. 1, 1966, p. 105–106.
Sci. Res. Council and Min. of Defence supported research.

An experiment was conducted on 18 subjects to investigate the extent of the Poggendorff illusion in the visual and tactile-kinesthetic conditions. The modified apparatus for measuring the latter is described. A procedure is used which tests the hypothesis that differences in the performance of subjects in the two conditions have arisen by chance. The mean difference ($\overline{D}$) between the extent of the illusion in the two conditions reaches a value of 0.02, the standard error (S.E.$\overline{D}$.) of which is 0.07; this yields a value of t of 0.29, the probability of occurrence of which on the null-hypothesis is greater than 0.25. These data indicate that (1) for each of these subjects the illusion is apparent in the visual condition; (2) for each of these subjects the illusion is apparent in the tactile-kinesthetic condition; and (3) for the group taken as a whole, the extent of the illusion does not differ significantly in the two conditions. It is concluded that a tactile analog of the Poggendorff illusion has been demonstrated.

A66-82334
ADVANCES IN RESPIRATORY PHYSIOLOGY.
Colin G. Caro, ed. (St. Thomas's Hosp., Med. School, London, Great Britain).
London, Edward Arnold (Publishers) Ltd., 1966, vii+348 p. Many refs.
$14.75.

A presentation is made of work in various specialized fields of respiratory physiology by selected workers in these areas. Individual chapters describe the following fields of interest: (1) cerebrospinal fluid and respiratory regulation; (2) regulation of bronchial caliber; (3) surface tension and alveolar lining; (4) permeability of the pulmonary blood-gas barrier; (4) ventilation-perfusion relationship and its role in alveolar gas exchange; (6) regional differences in blood flow and ventilation in the lung; (7) mechanics of pulmonary circulation; and (8) tissue respiration. Each chapter states the underlying theory as well as an analysis of the experimental methods and results in each area of research. Items of particular interest include discussions of the ventilation-perfusion ratio of helium, the effect of gravity on lung function, the airway response to heat and cold, the acclimatization and effect of altitude on respiration, the effect of carbon dioxide and hypoxia on various respiratory functions, and oxygen breathing.

A66-82335
APPLIED CLIMATOLOGY: AN INTRODUCTION.
John F. Griffiths (Tex. A and M U., Dept. of Meteorol., College Station).
London, Oxford U. Press, 1966, x+118 p. 21 refs.

A comprehensive presentation is given of the various areas of applied climatology. The first part of the book deals with the basic factors of climatology, giving temperature and rainfall data as well as an explanation of the Koppen classification. The second part of the work considers the way climate affects soils, flora and fauna, agriculture, and man. In the chapter on man the different physical factors affecting heat balance are reviewed. Comfort indices are discussed and clothing requirements are dealt with on world zonal levels. Beneficial and detrimental effects of climate on human health are discussed. Engineering aspects are included in chapters on shelter design, communications, and transport.

A66-82336
SURVIVAL ON THE MOON.
Lawrence Maisak.
New York, Macmillan Co., 1966, xv+159 p. 17 refs.
$3.95.

Survival of humans on the moon is discussed in terms of lunar topography and gravity; atmospheric composition and the role of algae farming; location and recognition of sources of water; space rations and problems of hydroponics; surface and subsurface shelter construction; and difficulties with dust, meteorites, temperature changes, solar and ultraviolet radiation, and mobility and atmosphere within a pressurized space suit. When working on the moon, the most noticeable changes will be the reduced acceleration of lunar gravity, lunar vacuum, and friction. Maneuverability on the moon may be by vehicles or by individual rocket propulsion systems. The accomplishments of Ranger missions VII to IX are summarized.

A66-82337
EFFECT OF COSMIC FLIGHT FACTORS ON FUNCTIONS OF CENTRAL NERVOUS SYSTEM [VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVOI SISTEMY].
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, 272 p. Many refs. In Russian.

Fifteen reports are collected on the single and combined effects of ionizing radiation, vibration, and acceleration on the metabolism and nervous system activity of laboratory animals. The effects on brain temperature, vestibular apparatus, spinal reflex arc, conditioned reflex, brain oxidative activity, respiration, cerebral blood circulation, and peripheral blood count were investigated in the laboratory. The knowledge is useful in predicting man's ability to adapt to extraterrestrial environment.

A66-82338
EFFECT OF RADIAL ACCELERATION ON TEMPERATURE OF ANIMAL BRAIN [DEISTVIE RADIAL'NYKH USKORENII NA TEMPERATURU GOLOVNOGO MOZGA ZHIVOTNYKH].
V. Ia. Klimovitskii.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, " Nauka", 1966, p. 11–24. In Russian.

Temperature under the dura mater was recorded in a dog and six rabbits exposed to radial acceleration in a centrifuge. Temperature measurements were carried out with thermistors to within 3.0×10^{-3} degrees centigrade. Positive longitudinal and transverse accelerations were applied. Animals were exposed to repeated daily accelerations of 10 g for 30 sec. with a 30 min. interval. During longitudinal accelerations acute decrease of temperature with immediate return to normal after the stopping was observed in rabbits. After repeated exposures the reaction increased at first, and then decreased. This phenomenon can be interpreted as the beginning of adaptation. During transverse accelerations a small temperature increase was observed in the dog and rabbits at the beginning of rotation. After the end of rotation a slow decrease of temperature with return to the normal after 15–20 min. took place in most cases. Temperature changes observed were similar to those induced by the increase of carbonic acid content in respired air.

A66-82339
ON FUNCTIONAL STATE OF OTOLITHS OF GUINEA PIG VESTIBULAR APPARATUS AFTER TWOFOLD CENTRIFUGATION [O FUNKTSIONAL'NOM SOSTOIANII OTOLITOVOI CHASTI VESTIBULIARNOGO ANALIZATORA MORSKIKH SVINOK POSLE DVUKRATNOGO TSENTRIFUGIROVANIIA].
Z. I. Apanasenko.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 25–44. In Russian.

The effect of centrifugation applied twice (chest-back 8 g, 15 min. with a 24-hr. interval), on the functional state of otoliths of the guinea pig vestibular apparatus was studied. Changes in some myoelectric characteristics of the vestibulotonic hind leg reflex were discovered. The changes were of less duration and in some cases were less considerable than those after vibration (vertical, 0.4 mm., 7 c.p.s., twice for 15 min. with a 24-hr. interval). Experimental animals showed no deviation from the normal, with the exception of slight leukocytosis. Spacecraft effects in some cases revealed the summation of vibration and centrifugation effects though not to the same degree.

A66-82340
EFFECT OF REPEATED VIBRATION ON THE FUNCTIONAL STATE OF SPINAL REFLEX ARC [VLIIANIE MNOGOKRATNOI VIBRATSII NA FUNKTSIONAL'NOE SOSTOIANIE DUGI SPINNOMOZGOVOGO REFLEKSA].
M. A. Kuznetsova.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 45–67. In Russian.

Guinea pigs were exposed to vertical vibration applied tenfold for 16 days (70 c.p.s., 0.4 mm., 15 min.). Vibration exposures caused parabiotic phenomena in the arc of defensive flexor reflex. An inverse correlation was discovered between the changes in latency duration and those in the strength of threshold electric stimulus. In the first part of the period of vibration exposures a cumulation of vibration effects was observed. In the second part, a tendency to the improvement of reflex activity was noted. In the investigated reflex arc parabiotic phases recurred. This fact indicates transfer from greater to lower inhibition. This phenomenon is thought to be due to complete adaptation to vibration stimulation. The vibrator noise caused changes in the reflex of control animals, which differed from those in the experimental animals.

A66-82341
EFFECTS OF VERTICAL VIBRATION AND NOISE ON CONDITIONED REFLEXES OF RATS [VLIIANIE VERTIKAL'NOI VIBRATSII I SHUMA NA USLOVNYE REFLEKSY KRYS].
N. N. Livshits and E. S. Meizerov.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 68–80. In Russian.

Motor food reflexes of rats were studied after three exposures to vertical vibration (70 c.p.s., 0.4 mm., 15 min.). The interval between the first exposure and the second was 14 days; between the second and the third it was seven days. In rats with a high initial level of conditioned reflexes the vibration caused inhibition with a disturbance of conformity between the level of conditioned reflexes and the stimulating strength. Significant individual variability in response to vibration exposure was discovered; in some animals, conditioned reflexes disappeared while in others they only decreased. In rats with a low initial level of conditioned reflexes vibration caused an increase in conditioned reflexes, disinhibition of differentiation, and phasic phenomena.

A66-82342
THE PROBLEM OF FUNCTIONAL SIGNIFICANCE OF CHANGES IN BRAIN BIOELECTRIC ACTIVITY AND OXIDATIVE ABILITY DURING VIBRATION [K VOPROSU O FUNKTSIONAL'NOI ZNACHIMOSTI IZMENENII BIOELEKTRICHESKOI AKTIVNOSTI MOZGA I EGO OKISLITEL'NOI SPOSOBNOSTI VO VREMIA VIBRATSII].
L. D. Luk'ianova and E. P. Kazanskaia.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 81–94. In Russian.

In rats vertical vibration (70 c.p.s., 0.4 mm., 15 min.) caused in higher regions of the central nervous system the appearance of a stable excitation focus accompanied by increased oxygen consumption and hypersynchronized oscillations of low frequency in the electroencephalogram. Excitation and the concentration of excitative processes in sensomotor and visual regions of the brain cortex were observed. The compensatory-adaptive mechanisms contributing to the decrease of vibration and sensitivity were carried out at the expense of the decreasing exciting process.

A66-82343
EFFECT OF VIBRATION STIMULUS ON BRAIN OXIDATIVE METABOLISM IN ANIMALS WITH PARTIAL DESTRUCTION OF AUDITORY AND VESTIBULAR APPARATUS [VLIIANIE VIBRATSIONNOGO RAZDRAZHENIIA NA OKISLITEL'NYI METABOLIZM GOLOVNOGO MOZGA U ZHIVOTNYKH S CHASTICHNYM VYKLIUCHENIEM SLUKHOVOGO I VESTIBULIARNOGO APPARATOV].
L. D. Luk'ianova and S. M. Ambrosova.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 95–104. In Russian.

Oxygen consumption in different parts of the brain was studied in rats exposed to repeated vertical vibration (70 c.p.s., 0.4 mm., 15 min.). Partial destruction of the vestibular apparatus contributed to the appearance of compensatory-adaptive adjustment on indexes without the decrease of general functional level of the central nervous system. In narcotized animals direct proof of the great role of the vestibular apparatus in the perception of vibration was obtained.

A66-82344
STUDY OF RELATIONSHIP OF BRAIN OXIDATIVE METABOLISM, ELECTRIC ACTIVITY, AND CONDITIONED-REFLEX ACTIVITY OF ANIMALS AFTER VIBRATION [ISSLEDOVANIE SOPRIAZHENNOSTI PROTSESSOV OKISLITEL'NOGO METABOLIZMA GOLOVNOGO MOZGA, EGO ELEKTRICHESKOI AKTIVNOSTI I USLOVNOREFLEKTORNOI DEIATEL'NOSTI ZHIVOTNYKH POSLE VIBRATSII].

L. D. Luk'ianova, A. V. Kol'tsova, E. S. Meizerov, and E. P. Kazanskaia.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 105–124. In Russian.

Oxygen consumption by brain tissues, total bioelectric activity, slow oscillations, and conditioned reflex activity was studied in rats exposed to vertical vibration (70 c.p.s., 0.4 mm., 15 min.) six times a week (30 times in all). The first period (first to fourth vibrations) was characterized by the appearance of after-vibration generalized inhibition in higher regions of the brain. In the second period (after the fourth vibration) compensatory-adaptive processes contributing to relative normalization of functions were developed. The third period (after the 20th to 25th vibration) was characterized by total decrease of functional activity of higher regions of the central nervous system.

A66-82345
CHANGE OF RESPIRATION DURING VIBRATION [IZMENENIE DYKHANIIA PRI VIBRATSII].
E. P. Kazanskaia and L. D. Luk'ianova.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 125–128. In Russian.

The respiratory rate during vibration was studied in rats exposed to vertical vibration (70 c.p.s., 0.4 mm., 15 min.). In the first half of vibration time, increased respiration rate was observed. In the second half of vibration exposure and after-vibration period no general response of the respiratory rate was discovered. Changes were observed in oxidative metabolism which did not appear to be connected with respiration changes.

A66-82346
SPECIFIC FEATURES OF THE EFFECTS OF DIFFERENT TYPES OF IRRADIATION ON HIGHER NERVOUS ACTIVITY OF SMALL ANIMALS. COMPARATIVE EFFECT OF FAST NEUTRONS, PROTONS AND GAMMA-IRRADIATIONS IN THE DOSE OF 300 RAD [OSOBENNOSTI DEISTVIIA RAZNYKH VIDOV IZLUCHENIIA NA VYSSHUIU NERVNUIU DEIATEL'NOST' MELKIKH ZHIVOTNYKH. SRAVNITEL'NOE DEISTVIE BYSTRYKH NEITRONGOV, PROTONOV I GAMMA-IZLUCHENII V DOZE 300 RAD (SOOBSHCHENIE I)].
A. P. Korolevskii.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 138–153. In Russian.

Comparative effects of fast neutrons, protons, 510 MeV, and gamma-irradiation in doses of 300 rad on higher nervous activity of mice were studied with conditioned motor reflex drinking method. All three types of irradiation induced the disturbance of excitation and inhibition nervous processes. Neutron- and gamma-irradiation led to the suppression of the excitation process while proton irradiation affected inhibition. According to the degree of effect the three types of irradiation form the following scale: neutrons > gamma-irradiation > protons. A parallelism was observed between the disturbances of conditioned reflex activity and changes in the peripheral blood.

A66-82347
SPECIFIC FEATURES OF THE EFFECTS OF DIFFERENT TYPES OF IRRADIATION ON HIGHER NERVOUS ACTIVITY OF SMALL ANIMALS. II. COMPARATIVE EFFECT OF FAST NEUTRONS AND GAMMA-IRRADIATION IN THE DOSE OF 25 RAD [OSOBENNOSTI DEISTVIIA RAZNYKH VIDOV IZLUCHENIIA NA VYSSHUIU NERVNUIU DEIATEL'NOST' MELKIKH ZHIVOTNYKH. SRAVITEL'NOE DEISTVIE BYSTRYKH NEITRONOV, I GAMMA-IZLUCHENII V DOZE 25 RAD. (SOOBSHCHENIE II)].
A. P. Korolevskii.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 154–164. In Russian.

Comparative effects of fast neutrons and gamma-irradiation (Co^{60}) in the dose of 25 rad on the higher nervous activity of mice were studied with conditioned reflex drinking method. Acute total neutron and gamma-irradiation induced the weakening of inhibition and excitation processes. The weakening of the processes in mice exposed to neutron irradiation was greater than in gamma-irradiated animals. Parallelism between the disturbances of conditioned reflex activity and changes in hematological indices was observed.

A66-82348
SPECIFIC FEATURES OF THE EFFECTS OF DIFFERENT KINDS OF IRRADIATION ON HIGHER NERVOUS ACTIVITY OF SMALL ANIMALS. III. COMPARISON OF THE EFFECT OF FAST NEUTRONS, PROTONS AND GAMMA-IRRADIATIONS IN THE DOSE OF 150 RAD [OSOBENNOSTI DEISTVIIA RAZNYKH VIDOV IZLUCHENIIA NA VYSSHUIU NERVNUIU DEIATEL'NOST' MELKIKH ZHIVOTNYKH. SRAVNITEL'NOE DEISTVIE BYSTRYKH NEITRONOV, PROTONOV I GAMMA-IZLUCHENII V DOZE 150 RAD. (SOOBSHCHENIE III)].
A. P. Korolevskii.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 165–179. In Russian.

Comparative effects of fast neutrons, protons, 510 MeV, and gamma-irradiation in doses of 150 rad on higher nervous activity of rats were investigated by means of the motor drinking conditioned reflex. In all irradiated animals distrubances of excitation and inhibition processes were discovered. After neutron- and gamma-irradiation exciting process was the most affected while proton irradiation suppressed the inhibitory process. Neutron irradiation was the most effective one, while proton irradiation was the least effective.

A66-82349
COMPARISON OF THE EFFECTS OF TOTAL CHRONIC AND ACUTE GAMMA-IRRADIATIONS OF THE HIGHER NERVOUS ACTIVITY OF WHITE RATS (PROBLEM OF THE ROLE OF TIME FACTOR) [SRAVNENIE DEISTVIIA OBSHCHIKH KHRONICHESKIKH I OSTRYKH GAMMA-OBLUCHENII NA VYSSHUIU NERVNUIU DEIATEL'NOST' BELYKH KRYS (K VOPROSU O ROLI FAKTORA VREMENI)].
E. S. Meizerov.
IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.
Edited by N. N. Livshits.
Moscow, "Nauka", 1966, p. 180–196. In Russian.

Two groups of rats were exposed to gamma-irradiation with Co^{60} in the dose of 160 r. One group was irradiated

to the dose-rate of 85 r/min. and the other one with 6 r/24 hr. Conditioned motor food reflexes and peripheral cell counts were studied. Acute and chronic irradiation caused similar changes in conditioned reflexes. The disturbances of higher nervous activity were somewhat more severe in rats exposed to chronic irradiation. The difference between the changes in the irradiated groups was not large, but nevertheless the changes were statistically significant. Contrary to the reactions of higher nervous activity, a great decrease of leukocyte, erythrocyte, and hemoglobin content in peripheral blood was observed in animals exposed to acute irradiation.

A66-82350

THE EFFECT OF PROLONGATED GAMMA-IRRADIATION ON THE FUNCTIONS OF VESTIBULAR ANALYZER AND THE ROLE OF TIME FACTOR IN RADIATION REACTIONS OF THE NERVOUS SYSTEM [DEISTVIE PROLONGIROVANNOGO GAMMA-OBLUCHENIIA NA FUNKTSII VESTIBULIARNOGO ANALIZATORA I ROL' FAKTORA VREMENI V LUCHEVYKH REAKTSIIAKH NERVNOI SISTEMY].

Z. I. Apanasenko.

IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.

Edited by N. N. Livshits.

Moscow, "Nauka", 1966, p. 197–217. In Russian.

Guinea pigs (males) were exposed to prolonged gamma-irradiation in the dose of 500 r at a dose rate of 0.6 r/min. Bioelectrical activity of hind leg extensors before, during, and after stimulation of the vestibular analyzer was investigated. Survival, weight, and general clinical state of the animal were studied. Prolonged irradiation induced strong and long-term change of electromyographic characteristics of hind leg muscle vestibulotonic reflex. The changes were larger and qualitatively different from those after acute irradiation with the same dose. All animals survived; radiation sickness and changes in peripheral blood were less severe than after acute exposure.

A66-82351

COMBINED EFFECT OF TWOFOLD VIBRATION AND PROLONGED IRRADIATION ON FUNCTIONAL STATE OF VESTIBULAR ANALYZER [KOMPLEKSNOE DEISTVIE DVUKRATNOI VIBRATSII I PROLONGIROVANNOGO OBLUCHENIIA NA FUNKTSIONAL'NOE SOSTOIANIE VESTIBULIARNOGO APPARATA].

Z. I. Apanasenko.

IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.

Edited by N. N. Livshits.

Moscow, "Nauka", 1966, p. 218–235. In Russian.

Guinea pigs were exposed to combined twofold vibration (15 min. before and after irradiation) and prolonged gamma-irradiation in the dose of 500 r at a dose rate of 0.6 r/min. Bioelectric activity of hind leg extensors before, during, and after stimulation of the vestibular analyzer was studied. Survival, peripheral blood, leukocyte count, weight, and general clinical state of the animals were recorded. Vibration action changed the radiation effects on electromyographic characteristics of vestibulo-tonic reflexes. These changes were most significant the first days after the exposure. Effects of prolonged irradiation were less affected by vibration than analogous effects of acute irradiation. Peripheral blood, cell counts, weight dynamics, general clinical state, and survival of animals under combined exposure showed no significant difference from corresponding parameters at one prolonged irradiation.

A66-82352

COMPLEX EFFECT OF VIBRATION AND IONIZING RADIATION ON CONDITIONED REFLEXES OF RATS [KOMPLEKSNOE DEISTVIE VIBRATSII I IONIZIRUIUSHCHIKH IZLUCHENII NA USLOVNYE REFLEKSY KRYS].

N. N. Livshits and E. S. Meizerov.

IN: VLIIANIE FAKTOROV KOSMICHESKOGO POLETA NA FUNKTSII TSENTRAL'NOI NERVNOI SISTEMY.

Edited by N. N. Livshits.

Moscow, "Nauka", 1966, p. 236–251. In Russian.

Conditioned motor food reflexes in rats were studied after exposure to: (1) vertical vibration (70 c.p.s., 0.4 mm., 15 min.) immediately followed by whole-body X-ray irradiation of 50 r; (2) vibrator noise for 15 min. followed by whole-body X-ray irradiation of 50 r; and (3) vibrator noise for 15 min. (control). All exposures were repeated three times. The interval between the first and second exposure was 14 days and between the second and third was seven days. During the first week after the first combined exposure, the vibration effect dominated. During the second week after the first exposure a combination of the effects of both factors was observed. After the second and the third combined exposures the effects of irradiation and vibration were cumulative.

A66-82353

MAINTAINING AN ABSOLUTE TEST HUE IN THE PRESENCE OF DIFFERENT BACKGROUND COLORS AND LUMINANCE RATIOS.

Munehira Akita and C. H. Graham (Columbia U., New York City, N. Y.).

Vision Research, vol. 6, Jun. 1966, p. 315–323. 11 refs. Contract Nonr 266(46) and Columbia U. supported research.

Measures were made of changes in test wavelength required to compensate for a contrast effect introduced by a background color. The test hue remained constant when the contrast effect was modified by a shift of the test wavelength, usually toward the direction of the background. Ratio of test-to-background luminance had an imprecisely specifiable influence on compensatory wavelength changes in the test area. Wavelength settings for similar test hues made in a dark surround at two levels of luminance, 1.1 and 12.0 mL., demonstrated a Bezold–Brücke shift due to intensity level.

A66-82354

THE EFFECT OF INTER-OCULAR DELAY AND REPETITION INTERVAL ON DEPTH PERCEPTION.

Eugene R. Wist and Walter C. Gogel (U.S. Army Med. Res. Lab., Fort Knox, Ky. and Calif. U., Psychol. Dept., Santa Barbara).

(Renshaw Vision Conf., Ohio State U., Apr. 1963 and Psychonomics Soc. Meetings, Bryn Mawr Coll., Aug. 1963).

Vision Research, vol. 6, Jun. 1966, p. 325–334. 21 refs.

Observers viewed a continuously illuminated, binocular standard stimulus, adjacent to which appeared a briefly illuminated, binocular comparison stimulus. Using the method of adjustment, observers positioned the comparison stimulus in depth so that it appeared equidistant to the standard stimulus under conditions in which an interocular delay in stimulation occurred with respect to the comparison stimulus. It was found that (1) Little change in equidistance settings occurred with delays of 32 msec. or less, but that with larger delays the apparent position of the comparison stimulus shifted away from the observer. (2) Increasing the time interval between successive pairs of comparison stimulus presentations from 150 to 300 msec. resulted in a similar shift in apparent position. (3) There was an interaction between delay and repetition interval such that the repetition interval had a larger

effect on equidistance settings for longer delays. The results are interpreted to support the notion of a continuum between stereoscopic-binocular and monocular stimulation. Physical simultaneity was not a necessary condition for stereopsis.

A66-82355
INVESTIGATION OF THE CONNECTIONS BETWEEN ROOM BRIGHTNESS AND PERCEIVED SIZE OF OBJECTS [UNTERSUCHUNGEN UBER DIE BEZIEHUNGEN ZWISCHEN DER HELLIGKEIT DES RAUMES UND DER WAHRGENOMMENEN GROSSE VON GEGENSTANDEN].
F. Liedemit and J. Reuter (Deut. Akad. der Wiss., Inst. für Optik und Spektroskopie, Berlin, East Germany).
Vision Research, vol. 6, Jun. 1966, p. 335–348. 22 refs. In German.

Two series of experiments were carried out to determine the connection between room brightness and relative size of objects perceived. In the first series a flat picture was presented; the second used a stereoscopic figure composed of two monocular pictures. The relative size of the objects perceived decreased logarithmically with darkening of the environment; although, after a certain value, an increase in room brightness did not increase the relative size of objects perceived. In everyday conditions, gradual darkening of the environment is not expected to influence size perception.

A66-82356
ESTIMATION OF A CORRELATION COEFFICIENT FROM AN UNCERTAINTY MEASURE.
William H. Pearson (Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Psychometrika, vol. 31, Sep. 1966, p. 421–433. 6 refs.

Graphs are given for estimating a correlation p_{XY} from a double-entry table. $2H_r$, twice the statistic H_r, "relative uncertainty" (the average of the ratios of the conditional uncertainty of each variable to its uncertainty) was computed. Mean $2H_r$'s were computed from 100 samples for each of several sample sizes and number of categories. Graphs relating mean $2H_r$ to $\hat{r}_H$, the estimated correlation, for 3–17 categories to each variable and 3 sample sizes—50, 100, and 500—were constructed. 2.5% and 97.5% fiducial limits curves were constructed for establishing confidence limits on p_{XY} and $\hat{r}_H$.

A66-82357
EFFECTS OF LIST LENGTH AND THE NUMBER OF RESPONSE ALTERNATIVES IN A SERIALLY LEARNED PAIRED-ASSOCIATES TASK.
Gary A. Davis (Wis. U., Dept. of Psychol., Madison).
Journal of General Psychology, vol. 75, Jul. 1966, p. 29–33. NIH supported research.

Ninety-six subjects participated in a serially learned paired-associates task. Four levels of list length were used (six, eight, 10, or 12 pairs) and three levels of response availability (10, 13, or 17 responses). The stimuli consisted of a sequence of lever switches, and the responses were pairs of adjacent lights in a matrix of lights. The major findings were as follows: (1) Both total time and trials to criterion increased in a near-perfect linear fashion with increased list length. (2) The number of available responses (the size of the light matrix) had no consistent influence on total time or trials to criterion. (3) Both increases in the number of the available responses and in list length tended to reduce subjects' self-paced responding rate. (4) Within each experimental condition, subjects who required more trials also took more total time. (5) Some subjects ignored the stimulus aspect of the paired-associates list and serially learned the responses, while others learned in a paired-associates fashion.

A66-82358
FORMATION AND MAINTENANCE OF RESPONSE HIERARCHIES AS FUNCTIONS OF RELATIVE PERCENTAGES OF OCCURRENCE OF ALTERNATIVE RESPONSE MEMBERS, INSTRUCTIONS, AND DISCRIMINATION.
Albert E. Goss (Mass. U., Dept. of Psychol., Amherst).
Journal of General Psychology, vol. 75, Jul. 1966, p. 95–106.
Contracts Nonr 2691(00) and 3357(03).

Formation and maintenance of response hierarchies were investigated by means of a single divergent paired associate unit which was administered to groups of subjects under a recall format through 12 cycles. The first phase of each cycle consisted of 10 presentations of the stimulus member and one or the other of two response members; the second phase consisted of 10 or 20 presentations of the stimulus member alone. Immediately after the last cycle, the stimulus member was presented alone 40 or 80 times. One variable was relative percentages of occurrence of the alternative response members (RPs) which varied from 50–50 to 90–10 in 10% steps. These RPs were combined orthogonally with combinations of requirement of a discrimination in responding to the stimulus member alone and regular instructions, or instructions to respond always with the more frequent of the two response members (maximize). They are also combined orthogonally with regular instructions and no requirement of a discrimination. During the cycles and, less markedly, during the first block of additional presentations of the stimulus member alone, the RPs changed from 50–50 to 90–10 resemblance between the patterns of alternation responses and the patterns of occurrence of alternative response members increased. The resemblance was greater without than with requirements of a discrimination.

A66-82359
THE EFFECT OF DIFFERENTIAL ANXIETY ON VERBAL PERFORMANCE.
Henry H. Reiter (C. W. Post Coll., Greenvale, N. Y.).
Journal of General Psychology, vol. 75, Jul. 1966, p. 115–117.

The relative effects of high and low anxiety upon verbal performance were studied. The hypothesis was that high anxious (HA) subjects were more easily conditioned to a critical word than low anxious (LA) subjects. Ninety undergraduate college students were administered the Taylor Manifest Anxiety Scale and were asked (before and after reinforcement) to rate six words along four qualitative dimensions (pleasant–unpleasant, soft–hard, good–bad, active–passive) according to a seven-point rating scale. Only the critical word Wagon was reinforced according to the following design: (a) HA subjects were positively reinforced ("good"), (b) LA subjects were positively reinforced, and (c) half of the Middle Anxious (MA) subjects were positively reinforced and the other half were negatively reinforced ("no"). The results showed that only HA subjects significantly changed their rating of the critical word after reinforcement (in the direction of pleasantness, goodness, softness, and activeness).

A66-82360
DIURNAL VARIATION OF CRITICAL FLICKER FREQUENCY.
John F. Walsh and Henryk Misiak (Fordham U., Dept. of Psychol., New York City, N. Y.).
Journal of General Psychology, vol. 75, Jul. 1966, p. 167–175. 10 refs.
Grant NIMH MH 07-743.

The effect of hour-to-hour variability upon critical flicker frequency (CFF) thresholds of 60 college resident students, 30 males and 30 females, was investigated. Monocular thresholds were obtained by the method of constant stimuli from 8 a.m. to 8 p.m. in five sessions spaced three hours apart. A diurnal effect was found in which there was an inverse relationship between CFF thresholds and time of day ($p < .05$). The highest values for CFF were obtained at 8 p.m. and 11 a.m., indicating that a linear relationship was also present ($p < .05$). In addition, three patterns of response were detected: (a) positive slope indicating an increase in CFF values with time of day; (b) negative slope showing a decrease in CFF with time of day; and (c) zero slope reflecting no basic change in threshold values over time. The validity of the three patterns of responding needs to be explored systematically in CFF as well as in other perceptual cognitive areas. Such patterns would be strong evidence against using averaged data in making evaluations of a function or an agent.

A66-82361
SUBHARMONIC COMPONENTS IN COCHLEAR-MICROPHONIC POTENTIALS.
Peter J. Dallos and Craig O. Linnell (Northwestern U., Biomed. Eng. Res. Center, Auditory Res. Lab., Evanston, Ill.).
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 4–11. 12 refs.
NIH supported research.

The properties of subharmonic distortion in cochlear microphonic potentials are described in guinea pigs and chinchillas. The nonlinear amplitude distortion appeared above 110 db. sound-pressure level (0.0002 dyn/cm.^{2}). The subharmonic components were measurable over a wide frequency range, although not necessarily at all frequencies for any given animal. When the sound intensity was raised above the threshold for the undertones, they appeared at a magnitude of the same order as that of the fundamental. The exact magnitude depended on the location of the recording electrodes and on the stimulus frequency. Only even-order undertones were seen. The first subharmonic to appear was the one at one-half of the stimulus frequency. Under favorable conditions if the intensity was increased beyond the occurrence of the first undertone, a second undertone appeared at one-fourth of the frequency of the drive. In general, as the second undertone became measurable, the first started to decline. The dynamic range of the distortion products was rather low.

A66-82362
SHIFTS IN AUDITORY THRESHOLDS PRODUCED BY IPSILATERAL AND CONTRALATERAL MASKERS AT LOW-INTENSITY LEVELS.
Donald D. Dirks and Jane Chandler Norris (Calif. U., Center for the Health Sci., Los Angeles).
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 12–19. 7 refs.
Natl. Inst. of Neurol. Diseases and Blindness supported research.

The present investigations were conducted to determine and describe some of the acoustic parameters of central masking. Shifts in threshold were observed during the following monotic and dichotic conditions: (1) pulsed-pulsed, in which both test signal and masker were pulsed simultaneously; (2) pulsed-continuous, in which the test tone was pulsed but the masker was continuous; and (3) continuous-continuous, in which both test tone and masker were steady. Test signals of 250, 1000, and 4000 c.p.s. were used. The degree of threshold shift resulting from central masking factors was dependent on the temporal presentation of the test signal and masker (whether pulsed or steady). Threshold shifts due to central masking increased with frequency and were related to the spectrum level of the masker. The largest shifts in threshold were found for a 4000-c.p.s. test signal when the masker was a pure tone close in frequency. In these instances, lateralization of the test signal toward the midline was observed as the threshold shift increased and, at times, subjects were unable to distinguish between the test tone and pure-tone masker. Although the results can be explained on the basis of central masking factors, the manner in which the subjects traced their thresholds during the condition where both test signal and masker tone were continuous suggested that all observed shifts in threshold may not be due to masking alone.

A66-82363
LATERALIZATION OF A WEAK SIGNAL PRESENTED WITH CORRELATED AND WITH UNCORRELATED NOISE.
James P. Egan and William Benson (Ind. U., Hearing and Commun. Lab., Bloomington).
(Acoust. Soc. of Am., 68th Meeting, Austin, Tex., Oct. 21–24, 1964).
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 20–26. 12 refs.
AFOSR supported research.

When a strong signal is presented monaurally, listeners can easily lateralize the sound. However, if noise is added to both ears, there may be uncertainty as to which ear received the signal. This uncertainty was measured over a range of signal energies with perfectly correlated noise (NO) and with uncorrelated noise (NU). In the main experiment, the monaural signal occurred on each trial, and this signal was presented to either the right or the left ear by random determination during the single observation interval. Listeners responded "right" or "left". Measures of signal detection were also secured with the monaural signal under relase from masking (NO) and without such release (NU). With uncorrelated noise (NU), the listener requires only slightly greater signal energy (1–2 dB) in order to lateralize as well as he can detect. With correlated noise (NO), the psychometric function for lateralization is not only displaced considerably toward higher signal energies, relative to those required for detection, but the slope of the function for lateralization is smaller than that for detection. When a monaural signal is easily detected in uncorrelated noise, it is also easily lateralized. However, when the signal is strong enough to be readily detected with correlated noise, it is still poorly lateralized.

A66-82364
SOME FACTORS AFFECTING THE PERCEPTION OF CONTINUITY IN ALTERNATELY SOUNDED TONE AND NOISE SIGNALS.
Lloyd Elfner and Jerry L. Homick (Kent State U., Ohio).
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 27–31. 8 refs.
NSF supported research.

The effects of the duration of white noise and frequency of tonal burst on the perception of continuity under monaural and dichotic presentation were investigated in 78 normally hearing college students who had demonstrated an ability to concentrate on an interrupted white noise which alternated with a tonal burst. The effect of the number of noise pulses in the stimulus interval was also investigated. Under monaural

presentation, the perception of continuity was affected by both the duration of the noise and the frequency of the tone. Only the duration variable was significant under dichotic presentation. The number of noise pulses in the stimulus interval significantly affected the perception of continuity.

A66-82365
MASKED DL FOR PITCH MEMORY.
J. D. Harris (U.S. Naval Submarine Med. Center, Groton, Conn.).
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 43–46. 16 refs.

This paper reports differential sensitivity for pitch memory of pure tones as frequencies from 0.125 to 2 kc.p.s. are progressively raised above white noise adjusted to a 50% masking effect at the 45-db. sensation level of the tone. The Weber fraction DF/F) improves with some negative acceleration thourgh 2 kc.p.s. both in favorable and in unfavorable masking levels, but below about 0.5 kc.p.s. the sensitivity progressively deteriorates. The Weber fraction is related linearly to loudness, the loudness of tones in noise being specified by balancing to a 1-kc.p.s. tone in quiet. However, tones in noise exhibit poorer Weber fractions than tones at the same loudness but with no mask. Thus, the noise introduces a brake on sensitivity not only by loudness reduction but by an additional mechanism. The number of distinguishable pitches between 0.125-2 kc.p.s. is reduced from 548 for tones in quiet at 45 db. sensation level, to only 170 for tones in noise at a very unfavorable (signal-to-noise) S/N ratio (tones 5 db. over the 50% masking point.)

A66-82366
TOLERABLE LIMIT OF LOUDNESS: ITS CLINICAL AND PHYSIOLOGICAL SIGNIFICANCE.
J. D. Hood and J. P. Poole (Med. Res. Council, Natl. Hosp., Otol. Res. Unit, London, Great Britain).
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 47–53. 7 refs.

In the normal-hearing subject, a sensation of unpleasant loudness is invariably associated with intensities of the order of 100 db. within the frequency range 500–4000 c.p.s. This is referred to as the loudness-discomfort level (LDL). The intensity distribution of LDL was established in a large group of subjects with unilateral end-organ deafness, in all of whom the presence of loudness recruitment had been verified by means of the alternate binaural loudness balancing procedure. In these, the distribution was similar to that of a normal-hearing group. By contrast, the LDL's of subjects with conductive or nerve-fiber deafness exceeded the maximum available audiometer intensity of 120 db. The test, therefore, is of particular value in establishing the presence or absence of loudness recruitment in bilateral deafness. These findings suggest a physiological limit of loudness perception, the theoretical implications of which are discussed.

A66-82367
REEXAMINATION OF A MODEL OF THE COCHLEA.
Dennis H. Klatt and Gordon E. Peterson (Mich. U., Commun. Sci. Lab., Ann Arbor).
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 54–61. 13 refs.
ONR supported research.

A model of cochlear mechanics is specified by a set of differential equations that relate pressures and displacements in the inner ear. The assumptions implicit in the equations are considered in this paper. The equations are solved by a straightforward difference-equation approximation on a digital computer. An equivalent electronic circuit was constructed in order to examine certain of the characteristics of the model. The response of the model is compared to physical data from a number of experiments.

A66-82368
FURTHER RESULTS ON BINAURAL UNMASKING AND THE EC MODEL.
Lawrence R. Rabiner (Bell Telephone Labs., Inc., Murray Hill, N.Y.), C. L. Lawrence, and N. I. Durlach (Mass. Inst. of Technol., Res. Lab. of Electron., Center for Commun. Sci., Cambridge).
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 62–70. 24 refs.
NASA, Joint Serv. Electron. Program, NSF, and NIH supported research.

Results of further experiments on the binaural unmasking of tones masked by broad-band Gaussian noise and further theoretical work on the equalization and cancellation (EC) model of binaural unmasking are reported. Data are presented on binaural unmasking for interaural time delays and/or phase shifts in the noise, and for statistically independent noise, at a variety of tone frequencies. Many aspects of these data cannot be interpreted by the preliminary version of the model, and consideration is given to some possible revisions of the model.

A66-82369
MODEL OF LOUDNESS SUMMATION APPLIED TO IMPAIRED EARS.
Bertram Scharf and Rhona P. Hellman (Northeastern U., Dept. of Psychol., Boston, Mass.).
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 71–78. 22 refs.
NIH supported research.

The loudness of complex sounds composed of three or four pure tones was measured as a function of the over-all spacing ΔF between the lowest and highest components. The measured relation between loudness and ΔF was compared to calculations from Zwicker's model of loudness summation. In eight ears with a conductive impairment, loudness summated normally and as predicted by the model; loudness remained approximately constant as a function of ΔF near threshold and increased with ΔF beyond the critical band at higher sensation levels. In eight ears with a cochlear impairment, loudness did not change with ΔF at any tested sensation level. This invariance of loudness was not predicted by the model nor was it found in six normal ears tested in the presence of a 90-db. uniform masking noise intended to simulate the cochlear impairment. Under masking, loudness summated as predicted. The unexpected results in cochlear pathology were ascribed, tentatively, to a possible widening of the critical band.

A66-82370
JUDGMENTS OF THE RELATIVE AND ABSOLUTE ACCEPTABILITY OF AIRCRAFT NOISE.
Dwight E. Bishop (Bolt Beranek and Newman Inc., Los Angeles, Calif.)
Journal of the Acoustical Society of America, vol. 40, Jul. 1966, p. 108–122. 15 refs.
FAA supported research.

Subjects selected from airport neighborhoods judged the acceptability of noise produced by actual aircraft flyovers

and by recorded flyover signals on both a relative and absolute (category) basis. Judgments were compared with the maximum perceived-noise level occurring during the flyovers. For a given perceived-noise level, little difference between ratings of takeoff and approach noise or live and recorded noise signals was observed. In the relative-judgment tests, a larger change in perceived-noise levels (16 PNdb.) was required for a doubling, or halving, of the acceptability rating than the 10 PNdb. originally assumed in developing the perceived-noise-level scale. In making category judgments of noise acceptability, a distinct shift between outdoor and indoor judgments occurred. Comparison with previous judgments of aircraft noise, employing different category scales, suggests relatively good agreement as to the noise levels at which a significant degree of dissatisfaction with the noise environment is expressed.

A66-82371
EFFECT OF SIXTY HOURS OF COMPLETE FASTING ON THE PHYSICAL EFFICIENCY OF HEALTHY MEN. 1. DIFFERENCES IN THE INVESTIGATED PARAMETERS AT REST AND DURING A STEADY STATE.
V. Brodan and E. Kuhn (Inst. of Human Nutr., Prague, Czechoslovakia).
Review of Czechoslovak Medicine, vol. 12, no. 3, 1966, p. 155–164. 39 refs.

The influence which 60 hrs. of fasting has on the physical fitness of seven healthy untrained young men was investigated. A six-minute ride on a bicycle ergomemter with medium grade loading was used. Changes in the blood pressure, pulse rate, pulmonary ventilation, respiratory volume and respiration rate, oxygen consumption and CO_2 output, respiratory equivalent, oxygen pulse, and respiratory exchange ratio were investigated, as well as in serum levels of lactate, pyruvate, free fatty acids and total ketone bodies at rest and at the time of maximum load when the steady state was attained. Changes in body-weight and the mechanical efficiency of work during fasting, as compared with the control period were also studied.

A66-82372
HEMODYNAMIC EFFECTS OF INTERMITTENT POSITIVE PRESSURE RESPIRATION.
Beverly C. Morgan, Wayne E. Martin, Thomas F. Hornbein, Edward W. Crawford, and Warren G. Guntheroth (Wash. U., School of Med., Seattle).
Anesthesiology, vol. 27, Sep.–Oct. 1966, p. 584–590. 19 refs.
Grants PHS HE-03998-08 and HE-9617-01; Wash. State Heart Assn. supported research.

The hemodynamic effects of intermittent positive pressure ventilation were studied in lightly anesthetized dogs following recovery from implantation of pulsed ultrasonic flow transducers on the aorta and vena cava. A partial rebreathing system was utilized to maintain constant arterial carbon dioxide tension. Data were obtained during spontaneous respiration and using a respirator, with peak airway pressures of 10, 20 and 30 cm. of water, inspiratory to expiratory ratios of 1:2, 1:1 and 2:1. Maximum values for stroke volume and cardiac output occurred during spontaneous breathing. Cardiac output and aortic stroke volume decreased with increasing airway pressure and increased inspiratory to expiratory ratios. Venous return was inhibited by increasing pressure, and changes in vena caval flow were reflected in changes in aortic flow within the time of two heart beats. The circulatory effects of positive pressure breathing are related to the mean intrathoracic pressure and the effect on venous return.

A66-82373
EFFECT OF ANESTHETICS ON CENTRAL NERVOUS SYSTEM TOXICITY OF HYPERBARIC OXYGEN.
James R. Harp, Brett B. Gutsche, and C. R. Stephen (Duke U., Med. Center, Div. of Anesthesiol., Durham, N. C.).
Anesthesiology, vol. 27, Sep.–Oct. 1966, p. 608–614. 20 refs.
Grant PHS 1 F2 NB 23,984-01.

Eighteen dogs were exposed to oxygen at four atmospheres absolute. Seven animals rendered quiescent with succinylcholine served as controls. Five animals (six exposures) were anesthetized with thiamylal sodium and six animals were anesthetized with halothane. All groups showed evidence of central nervous system oxygen poisoning. In the control dogs, toxicity was manifested in three animals by convulsions and cardiovascular collapse, while a fourth animal had convulsions followed by spastic hind limb paralysis. Convulsions developed in four animals anesthetized with halothane after more prolonged exposures, but associated cardiovascular symptoms were absent. While no evidence of convulsions was observed in the thiamylal series, four of the five animals showed evidence of delayed central nervous system toxicity. The data suggest that safe exposures to oxygen tensions of four atmospheres absolute must be brief, and that no adequate means for the detection of delayed central nervous system oxygen poisoning is presently available.

A66-82374
PHYSIOLOGIC RESPONSES OF THE ANESTHETIZED DOG TO OXYGEN AT FIVE ATMOSPHERES ABSOLUTE.
Brett B. Gutsche, James R. Harp, and C. R. Stephen (Duke U., Med. Center, Div. of Anesthesiol., Durham, N. C.).
(Am. Soc. of Anesthesiol., Ann. Meeting, Denver, Colo., Oct. 26, 1965).
Anesthesiology, vol. 27, Sep.–Oct. 1966, p. 615–623. 20 refs.
Grant PHS 1 F2 NB 23,984-01.

Thirty-two dogs were subjected to inspired oxygen tensions of 3,860 mm. of mercury (60 p.s.i.g.) for one hour, or for 15 min. after the onset of electroencephalogram (EEG) convulsions. Seven animals received only succinylcholine and served as controls. Five animals each were exposed to succinylcholine in combination with thiopental, halothane, methoxyflurane, nitrous oxide, or a neuroleptanalgesic combination of droperidol and fentanyl. The anesthetic drugs afforded varying degrees of protection from oxygen toxicity, but no agent provided complete protection from the toxic effects. The means by which the anesthetic drugs conferred protection, as well as implications of anesthesia at high pressures of oxygen, are discussed.

A66-82375
LUNG MECHANICS AND PHYSIOLOGIC SHUNT DURING SPONTANEOUS BREATHING IN NORMAL SUBJECTS.
Grant Fletcher and Jergen L. Barber (Stanford U., School of Med., Dept. of Anesthesia, Palo Alto, Calif.).
Anesthesiology, vol. 27, Sep.–Oct. 1966, p. 638–647. 33 refs.
Grant NIH TI-GM-86205; John A. Hartford Found. supported research.

The mechanics of breathing, lung compliance, and AaD_{O2} (shunt) during air and oxygen breathing were studied in 16 normal subjects. In five subjects, the effect of intravenously administered morphine sulfate on the same parameters was also investigated. Compliance and AaD_{O2} varied little in the individual subjects during spontaneous breathing. Spontaneous sighing was not followed by changes in lung mechan-

ics or compliance; similarly, almost complete absence of sighing for periods from 60–90 min. following administration of morphine sulfate was not associated with changes in lung mechanics or shunt. The transient increase in compliance that followed maximal inspiration is thought to be the result of changes in surface tension properties of the lungs and not to decrease in the number of perfused but unventilated (atelectatic) alveoli. We propose that lung mechanics and ventilation perfusion relations during spontaneous breathing are regulated on a breath-to-breath basis and that sighing does not play a significant part in this regulation.

A66-82376
NONLINEAR AND TIME-VARYING DYNAMICAL MODELS OF HUMAN OPERATORS IN MANUAL CONTROL SYSTEMS.
Walter W. Wierwille and Gilbert A. Gagné (Cornell U., Cornell Aeron. Lab., Avionics Dept., Buffalo, N. Y.).
Human Factors, vol. 8, Apr. 1966, p. 97–120. 5 refs.
NASA Contract NAS 1-4920.

The application of a deterministic theory for characterizing or modeling the dynamics of a human operator in a manual control system is described. Linear time-varying, nonlinear time-varying, and non-linear constant-coefficient models are obtained by applying the theory to tracking data taken for one- and two-axis tasks with various displays. The accuracy and fidelity of these advanced models are explored in detail. New information about time variability and nonlinearity of the human operator, obtained by studying the models and the manual control system signals, is presented.

A66-82377
DESIGN OF CONTROLS USING FORCE AS A CRITERION.
Stephan A. Konz and Robert A. Day (Kan. State U., Dept. of Ind. Eng., Manhattan).
Human Factors, vol. 8, Apr. 1966, p. 121–127. 20 refs.

A force platform was used to study the effect of varying the height and handle orientation of a push–pull task. Each of the ten subjects performed the task at knee, hip, waist, chest, and eye heights and at each of the heights the handle was oriented in five different positions. Even though the force required for the task itself did not vary, changing the height of the handle forced each subject to exert a force to maintain his own body position. This force exerted by the subject was minimized when the handle was at chest height. The only previous studies on optimum work heights have concerned work surface location. Since their usual recommendations are to place a work surface below rather than above the elbow, it seems additional experimentation is desirable.

A66-82378
EXPERIMENTAL ISOLATION OF THE DRIVER'S VISUAL INPUT.
Donald A. Gordon (U.S. Dept. of Com., Bur. of Public Roads, Washington, D. C.).
Human Factors, vol. 8, Apr. 1966, p. 129–137. 8 refs.

A technique for isolating the operator's visual input is presented. The method involves decreasing the visual field so that the essential information is obtained by the operator in separate visual fixations. A continuous film record is made to indicate the center of visual aim and the content of each fixation. Using this aperture device, visual positional data were obtained on ten drivers on a two-lane low traffic density road. The essential information was found to be the road edges and center lane marker. The manner in which this information was obtained differed from driver to driver. The film records refute the notion that the driver has a fixed point of forward reference, or that a common pattern of viewing is shared by all drivers. The hypothesis is presented that the persistent pattern of fixation movements forward to the limits of the road, and back again to the vehicle are explained by the contradictory requirements of perceptual anticipation and vehicular alignment with the road.

A66-82379
NOTE ON DETECTION OF VEHICLE VELOCITY CHANGES.
Errol R. Hoffmann (Melbourne U., Dept. of Mech. Eng., Australia).
Human Factors, vol. 8, Apr. 1966, p. 139–141.
Australian Road Res. Board supported research.

Simple expressions are derived for the time required by an observer in a moving vehicle to detect accelerations and decelerations of a leading vehicle. The expressions, which are derived by the use of dimensional analysis, are in agreement with the experimental results of Braunstein and Laughery (1964). Latency time is shown to vary as the square root of separation distance and as the inverse square root of lead vehicle acceleration

A66-82380
INTERSENSORY COMPARISONS OF REACTION TIME USING AN ELECTRO-PULSE TACTILE STIMULUS.
Jay R. Swink (Kan. State U., Manhattan).
Human Factors, vol. 8, Apr. 1966, p. 143–145. 7 refs.

The literature on cutaneous communication suggests that a square wave electro-pulse may be a more effective tactile stimulus for cross modality comparisons of reaction times than more traditional stimuli. It was hypothesized that the electro-pulse would give faster reaction times than either light or sound, when presented independently or in simultaneous combinations with the other stimuli. Mean reaction times of 10 male subjects, analysis of variance, and mean separation test all indicated that the electro-pulse resulted in faster reaction times and less variability of responses than the light or buzzer in both single and combined presentations. The hypotheses were supported and an ordering of reaction times was statistically established as following from the hypotheses. Pooling of stimuli effectiveness was offered as an explanation for the rapid reaction times of combined stimuli.

A66-82381
DISTORTION, FILL AND NOISE EFFECTS ON PATTERN DISCRIMINATION.
Raymond B. Webster (Bunker-Ramo Corp., Canoga Park, Calif.).
Human Factors, vol. 8, Apr. 1966, p. 147–155. 23 refs.
Grant NIH MHO 7938-01.

The effects of distortion, fill, and noise on pattern discrimination were investigated in 144 male and female undergraduates. Patterns consisting of black filled squares were generated from a 10×10 matrix on a random basis. There were four levels of pattern fill or complexity. Distortion was the random displacement of basic pattern elements while noise was the filling in of additionally selected (on a random basis) pattern elements. The method of constant stimuli was employed. Patterns were projected automatically with a stimulus presentation time of 3.0 sec. and a constant intertrial interval of 5.0 sec. The results indicated that the discrimination of patterns, as generated in this study, were significantly affected by fill, noise, and distortion at the 0.01

level. Interaction effects were significant also at the same level. Response times were significantly affected as a function of fill and noise.

A66-82382
THE INSTRUCTIONAL SYSTEM APPROACH TO TRAINING.
Roger A. Kaufman, Robert E. Corrigan, and Charles L. Nunnelly (Douglas Aircraft Co., Inc., Long Beach, Calif.).
Human Factors, vol. 8, Apr. 1966, p. 157–162.
Douglas Aircraft Co., Inc. supported research.

A generalized model for an Instructional System is offered, as well as a model for such a system for use in preparing training and training materials for the U.S. Air Force. The rationale for a systematic approach to training is presented along with a discussion of the relationship between an Instructional System and Programmed Instruction.

A66-82383
THE INSTRUCTIONAL SYSTEM APPROACH TO MAINTENANCE TECHNICAL TRAINING: DEVELOPMENT AND IMPLEMENTATION MODEL.
Charles L. Nunnelly, Andrew G. Klemmer, Robert E. Corrigan, and Roger A. Kaufman (Douglas Aircraft Co., Inc., Long Beach, Calif.).
Human Factors, vol. 8, Apr. 1966, p. 163–172.
Douglas Aircraft Co., Inc. supported research.

An Instructional System model is presented for meeting Maintenance Technical Training requirements for complying with U.S. Air Force weapon system requirements. Methodology is also presented for determining training requirements and identifying appropriate methods/media combinations for meeting student terminal performance requirements.

A66-82384
INSTRUCTIONAL SYSTEM APPROACH TO FLIGHT CREW TRAINING.
Kenneth B. Wallis, Warren L. Ewart, and Roger A. Kaufman (Douglas Aircraft Co., Inc., Long Beach, Calif.).
Human Factors, vol. 8, 1966, p. 173–178.
Douglas Aircraft Co., Inc. supported research.

The rationale for analysis and definition of flight crew training requirements is discussed. Using the Instructional System Approach, the concept of flight crew performance from a management aspect is presented together with methods for determining detailed flight crew training requirements.

A66-82385
LEARNING AND RETENTION OF WORD-PAIRS WITH VARYING DEGREES OF ASSOCIATION.
A. W. Heim, K. P. Watts, I. B. Bower, and K. E. Hawton (Cambridge U., Psychol. Lab., Great Britain).
Quarterly Journal of Experimental Psychology, vol. 18, Aug. 1966, p. 193–205. 9 refs.
Med. Res. Council supported research.

The roles of degree of meaningfulness and frequency of repetition were compared in the learning and retention of word-pairs. The (student) subjects were divided into three groups. The first group learned 25 word-pairs whose members were frequently and highly meaningfully associated with each other. The second group learned 25 word-pairs which were associated far less frequently and meaningfully, while those of the third group were as lacking in associative value as possible. The stimulus-words were ambiguous; they were identical for each of the three groups; the word-pairs were presented, in randomized order, repeatedly, during the learning stage until the subject achieved the criterion of 20 (or more) correct word-pairs. After an interval of 60–90 days, the subjects were retested for retention. The results indicated that degree of meaningfulness plays a greater role than does frequency of repetition, both in learning and in recall; that the role of repetition tends to increase, however, as the meaningfulness of the material decreases; and that individual differences in method of learning increase with the difficulty of the material to be learned.

A66-82386
VISUAL AND AUDITORY STORES IN SHORT-TERM MEMORY.
Bennet B. Murdock, Jr. (Mo. U., Dept. of Psychol., Columbia).
Quarterly Journal of Experimental Psychology, vol. 18, Aug. 1966, p. 206–211. 12 refs.
Grant NIMH MH 10,882.

If retrieval in short-term memory can be either from a preperceptual sensory store or from a post-perceptual memory then recall should vary as a function of input into sensory store. To test this possibility two experiments with paired associates compared visual and auditory presentation under conditions as comparable as possible. In both experiments modality interacted with retention interval: more recency with auditory but, in Experiment I, more primacy with visual. The interaction was taken as support for the hypothesis. An alternative hypothesis (that storage is post-perceptual but not a-historical) is discussed and weak negative evidence is presented.

A66-82387
REMEMBERING A LIST OF TWO-DIGIT NUMBERS.
H. C. A. Dale and A. D. Baddeley (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Quarterly Journal of Experimental Psychology, vol. 18, Aug. 1966, p. 212–219. 7 refs.

The way subjects remember a list of two-digit numbers was examined in some detail. Intrusions in free recall were not random. They resembled omissions in having the same first digit but not in other ways. This non-randomness of recall errors was used to construct recognition tests of varying difficulty. Numbers which occurred commonly as intrusions were difficult to distinguish from the correct items when used as distractors in recognition tests. The experiments suggest that the previously observed relationship between recognition efficiency and number of alternatives (Davis, Sutherland, and Judd, 1961) can be attributed to the increased probability that such intrusions will be included when the total number of distractors is increased.

A66-82388
THE EFFECT OF INTERPOLATED ACTIVITY ON A TREBLE RIGHT–LEFT ALTERNATION TASK.
E. A. Taylor, M. J. McEwen, and L. Weiskrantz (Psychol. Lab., Cambridge, Great Britain).
Quarterly Journal of Experimental Psychology, vol. 18, Aug. 1966, p. 220–227. 16 refs.

In a delayed treble alternation task the number of errors made by human subjects increased when an irrelevant task was presented in the delay interval. The number of errors increased with the number of items presented in the delay interval, but neither the difficulty of the irrelevant task nor its similarity to the alternation task affected the number of errors.

A66-82389
THE EFFECT OF SUPERSEDING SIGNALS.
Robert Gottsdanker (Calif. U., Dept. of Psychol., Santa Barbara).
Quarterly Journal of Experimental Psychology, vol. 18, Aug. 1966, p. 236–249. 8 refs.
Contract AF 49(638)-730.

Eight adult human subjects were given a step-tracking task in which an occasional second signal within 50, 70, 90, 120, or 240 millisec. called for curtailing or reversing the first command. It was found for inter-signal intervals through 120 millisec. that the shorter the interval the greater was the reduction in amplitude and duration of the majority of responses, with no delay in the effect of the second signal. Where a larger change of response was called for, reversal rather than curtailment, there was a greater effect. A second signal occurring at the 240-millisec. interval (in almost all cases after the start of the response), had no detectable effect. Since the over-all reaction time (RT) was about 180 millisec., it is evident that for at least the first two-thirds of the RT period the initial response is not typically impervious to the effect of a second signal. Contrary to the expectations of the uncommitted-period version of the hypothesis of substitutive grouping, a reversing signal at the 50-millisec. interval did not yield many reversed responses. Moreover this view cannot accommodate the finding that for intervals through 120 millisec., relatively few distributions of response amplitude can be accounted for by the summation of instances of response to the first signal alone and to the second signal alone. It is concluded that for these intervals, there were generally either overlapping responses to the two signals or else unitary responses in which the two signals were grouped to produce a combined effect.

A66-82390
DECISIONS CONCERNING THE REJECTED CHANNEL.
Everdina A. Lawson (U. Coll., Phonetics Dept., London, Great Britain).
Quarterly Journal of Experimental Psychology, vol. 18, Aug. 1966, p. 260–265. 5 refs.
D.S.I.R. and Central Res. Fund supported research.

It was thought that the physical aspects of auditory stimuli were possibly transmitted via separate pathways from those transmitting the verbal aspects. Three experiments were designed to test this hypothesis. In these experiments subjects had to perform a shadowing task and had to respond simultaneously on response keys to pips superimposed in either ear on verbal messages. The response to these pips was of increasing complexity, in that it was a simple reaction time which was measured in the first experiment, a choice reaction time in the second experiment, and a more complex choice reaction time in the third experiment. Subjects were able to perform these tests although the increasing difficulty was reflected in longer reaction times and more errors. The reaction times to the pips presented to the ear which was not being shadowed were slower, and the errors made to pips in both channels, were "false positives" rather than errors of omission. These results were taken as favoring the hypothesis.

A66-82391
THE ROLE OF THE INTERPOLATED TASK IN SHORT-TERM RETENTION.
R. Conrad and A. J. Hull (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Quarterly Journal of Experimental Psychology, vol. 18, Aug. 1966, p. 266–269. 15 refs.

It was proposed that a single set of operations based on classical interference theory is adequate to describe the phenomena of both short- and long-term memory. Keppel and Underwood (1962) proposed that short-term forgetting is due to proactive interference and, by implication, not a result of trace decay. An experiment which varied retention interval and the nature of the interpolated task, (recalling letter or digit sequence after interval of non-interfering activity) gave results which indicate that when the amount forgotten and the nature of errors are considered, a decay model is supported, and the proactive interference suggestion is untenable.

A66-82392
THE EFFECT OF GRIP-TENSION ON TACTILE-KINAESTHETICJUDGMENT OF WIDTH.
G. Burn Evans and Edgar Howarth (Alberta U., Dept. of Psychol., Canada).
Quarterly Journal of Experimental Psychology, vol. 18, Aug. 1966, p. 275–277. 9 refs.
Grant NRC, Canada APA-85.

The effect of various grip-tensions on the accuracy of kinesthetic width judgments was tested. Forty first-year psychology students were used as subjects. Significant differences in accuracy between pressures were found in the descending adjustments with greatest accuracy at 1.0 kg. Some significant differences were found between pressures in ascending adjustments. All subjects overestimated on the descending and underestimated on the ascending trials at all pressure levels. Increased grip-tension reduced the accuracy of width judgment in terms of constant error while affecting variance only slightly.

A66-82393
METABOLISM OF HUMAN SERUM ALBUMIN IN MAN DURING ACUTE EXPOSURE TO HIGH ALTITUDE (14,100 FEET).
Martin I. Surks (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Physiol. Div., Denver, Colo.).
Journal of Clinical Investigation, vol. 45, Sep. 1966, p. 1442–1451. 37 refs.

The metabolism of human serum albumin was studied by means of albumin-^{131}I in five young males at 5,280 feet and for eight days at 14,000 feet altitude. The data were analyzed in a manner which made possible the daily estimation of the rate of albumin degradation and synthesis + net transfer from the extravascular to intravascular compartments. Albumin degradation was increased markedly for 24 to 48 hours within the first three days at high altitude. A large shift of high specific activity albumin from the extravascular to intravascular compartments occurred towards the end of altitude exposure and was accompanied by a decrease in the rate of albumin synthesis + net transfer. A decrease in the intake of calories and protein (minimum −0.90 g. per kg. per day) as well as a negative nitrogen balance was observed during the high altitude period. The data are discussed in relation to changes in thyroid and adrenocortical function observed in this environment.

A66-82394
EFFECTS ON EXPERIMENTAL ANIMALS OF LONG-TERM CONTINUOUS INHALATION OF NITROGEN DIOXIDE.
B. L. Steadman, R. A. Jones, D. E. Rector, and J. Siegel (Natl. Naval Med. Center, U.S. Navy Toxicol. Unit, Bethesda, Md.).
Toxicology and Applied Pharmacology, vol. 9, Jul. 1966, p. 160–170. 16 refs.

One preliminary acute eight-hour study at a concentration of 123 mg./m.^{3} of nitrogen dioxide, and one 30-day repeated study at a level of 67 mg./m.^{3} were conducted on rats, guinea pigs, rabbits, squirrel monkeys and dogs. Both exposures produced marked lung irritation and high mortality in all species. The gross pathologic findings in the lungs of surviving animals indicated hemorrhagic pulmonary edema in the 123 mg./m.^{3} study, and vascular congestion and focal hemorrhage in the 67 mg./m.^{3} study. Five 90-day continuous studies were run at 0.9, 1.0, 9.2, 21.3, and 21.6 mg./m.^{3} of nitrogen dioxide. Except for a possible slight weight loss, there were no effects noted at 0.9 and 1.0 mg./m.^{3}. At 9.2 mg./m.^{3} there was a significant increase of mortality in guinea pigs and rabbits, and at the 21.3 and 21.6 mg./m.^{3} levels there was a significant increase in mortality in all species except the dog. Minimal pathologic lung changes were seen at the highest concentrations. Cumulative 30-, 60-, and 90-day mortality data for the continuous exposure studies indicate that one cannot safely extrapolate from the 30-day results to anticipate the effects which may occur after 90 days. Care should also be taken in extrapolating continuous-exposure guidelines from data obtained in repeated-exposure studies. It is believed that the submarine guideline of 0.5 p.p.m. (0.9 mg./m.^{3}) will not cause any untoward effects in personnel exposed continuously for 60 days. The choice of analytical procedure is critical in measuring the concentration to which animals are exposed. Absorption of samples in 0.1N NaOH is not satisfactory. Absorption directly into the nitriting reagent is the method of choice.

A66-82395
LEUKOCYTE RESPONSE FOLLOWING SIMULTANEOUS IONIZING AND MICROWAVE (RADAR) IRRADIATION.
R. A. E. Thomson, S. M. Michaelson, and J. W. Howland (Rochester U., School of Med. and Dentistry, Dept. of Radiation Biol. and Biophys., N. Y.).
Blood, vol. 28, Aug. 1966, p. 157–162. 5 refs.
Contracts AF 30(602)-2248 and AEC W-7401 Eng-49.

Simultaneous microwave and X-irradiation at a sublethal X-ray dose level modified the hematologic response to X-irradiation in dogs. Earlier neutrophil recovery and delayed lymphocyte and hematocrit recovery resulted following simultaneous microwave and X-ray exposure.

A66-82396
AERIAL DELIVERY OF BLOOD.
John M. Lukeman (Brooke Gen. Hosp., Clin. Pathol. Sec., Fort Sam Houston, Tex.), Michael J. Skvorak (Brooke Army Med. Center, Med. Field Serv. School, Dept. of Pathol. and Lab. Sci., Fort Sam Houston, Tex.), and Arthur B. Papineau (U.S. Army Hosp., Lab. Serv., Okinawa, Japan).
Military Medicine, vol. 131, Sep. 1966, p. 796–801.

Free-fall delivery of blood cartons from root top height of 60 ft. proved unsatisfactory except when bulky padding was utilized. This type of packaging was too time consuming and inefficient. Delivery of a blood shipping carton from roof top height of 60 ft. supported by a pilot parachute proved ineffective since from this low altitude the parachute did not open sufficiently to give support and to prevent damage to the contents of the carton. Release of blood shipping cartons from hovering and moving helicopters and fixed wing aircraft at heights of 200 to 500 ft. utilizing 68" pilot parachutes resulted in successful delivery in every attempt when packaged according to specifications outlined. One pilot parachute should be used for each blood shipping carton, since one is insufficient to adequately support more than one shipping carton. For optimum accuracy of delivery, a pilot parachute is more reliable than a cargo parachute because of the centrally located aperture. Training of personnel in packaging techniques and rigging of parachutes can be accomplished with minimal time and effort. Items utilized in packaging and rigging can be obtained from quartermaster and medical supply.

A66-82397
THE EFFECT OF INHIBITORS ON THE PATH OF CARBON IN PHOTOSYNTHESIS BY CHLORELLA AT LOW PARTIAL PRESSURES OF CO_2. I. METHYLAMINE.
B. J. Miflin and C. P. Whittingham (Imp. Coll., Botany Dept., London, Great Britain).
Annals of Botany, vol. 30, Jul. 1966, p. 329–337. 11 refs.
Agr. Res. Council supported research.

Methylamine has previously been shown to uncouple phosphorylation in isolated chloroplasts. Results presented here are consistent with its having a similar action in *Chlorella pyrenoidosa*. It both stimulates oxygen production and inhibits carbon dioxide fixation. It markedly affects the distribution of carbon within the photosynthetic carbon reduction cycle at low partial pressures of carbon dioxide, decreasing the amount of sugar diphosphates and increasing that of PGA. The production of glycollate and glycine is diminished in the presence of methylamine but there is little effect on sucrose.

A66-82398
THE EFFECT OF INHIBITORS ON THE PATH OF CARBON IN PHOTOSYNTHESIS BY CHLORELLA AT LOW PARTIAL PRESSURES OF CO_2. II. THE EFFECT OF INHIBITORS ON OXYGEN EVOLUTION.
B. J. Miflin and C. P. Whittingham (Imp. Coll., Botany Dept., London, Great Britain).
Annals of Botany, vol. 30, Jul. 1966, p. 339–347. 11 refs.
Agr. Res. Council supported research.

The effects were investigated of two inhibitors of photosynthetic oxygen evolution (3-(3,4 dichlorophenyl)-1,1-dimethylurea (DCMU) and hydroxylamine) on the incorporation of carbon-14 into photosynthestic intermediates in *Chlorella pyrenoidosa*. Addition of DCMU produced almost immediate inhibition of fixation; the effect was similar to that observed previously as a consequence of darkening. Hydroxylamine stimulated incorporation into glycollate but decreased that into the sugar mono- and di-phosphates of the photosynthetic carbon reduction cycle (PSCR). Transient changes observed upon the addition of hydroxylamine suggest that glycollate may be derived from the intermediates of the PSCR cycle. This action of hydroxylamine is not believed to be due to its inhibition of the mechanism of oxygen evolution.

A66-82399
DRUGS WITH POSSIBLE OCULAR SIDE-EFFECTS.
H. Green and J. Spencer.
London, The Hatton Press Ltd., 1966, [74] p.

An alphabetic listing of 128 drugs which might have ocular side-effects is presented, with information on content, use, and manner of presentation. The ocular side-effects may range from alterations in the refractive error, interference with accommodation, or decompensation of an oculomotor imbalance, to serious changes in ocular tissues, such as cataract and retinal degeneration.

A66-82400
BERYLLIUM: ITS INDUSTRIAL HUGIENE ASPECTS.

Edited by Herbert E. Stokinger (PHS, Div. of Occupational Health, Toxicol. Sect., Cincinnati, Ohio).
New York, Academic Press, 1966, xiii+394 p. 909 refs.

A detailed account is presented of knowledge accumulated in the last 20 years on the industrial hygiene aspects and toxicology of beryllium and its compounds. Physics and chemistry of the compounds are stressed. History, pathology, diagnostic problems, occupational health and community aspects, and advances in control and management of beryllium disease are discussed and research results are reported.

A66-82401
CRITICAL FLICKER FUSION PERIMETRY AND THE ADAPTATION LEVEL OF THE EYE.
T. Shipley and Amelia Fry (Miami U., School of Med., Bascom Palmer Eye Inst., Fla.).
Nature, vol. 211, Sep. 17, 1966, p. 1315–1317. 5 refs.

Uncontaminated drak-adaptation curves on human eyes were obtained, and experimental measurements were taken of critical flicker fusions and of thresholds at alternate minutes in the same eye. The threshold curves did not have alpha flex points, but they had high final values, indicating pure cone curves. There was a clear and steady fall in flicker resolution with time despite the fact that there was no evidence for flicker alpha points (no rod intrusion). Flex points were clearly demonstrated in the curves for critical flicker fusion.

A66-82402
THYROCALCITONIN: FAILURE TO DEMONSTRATE A PARATHYROID RELEASING FACTOR.
G. V. Foser (Postgraduate Med. School, Dept. of Chem. Pathol., London, Great Britain).
Nature, vol. 211, Sep. 17, 1966, p. 1319–1320. 10 refs.
AHA supported research.

The existence of a parathyroid factor responsible for the thyroid release of the plasma calcium lowering hormone, thyrocalcitonin, was investigated in intact and parathyroidectomized rats. The presence of the parathyroids in the intact animals failed to provide protection against exogenously induced hypercalcemia (intraperitoneal injection of 5 mg. CaCl per 100 g. body weight). In parathyroidectomized rats, the thyroids appeared to secrete thyrocalcitonin as efficiently as in intact animals.

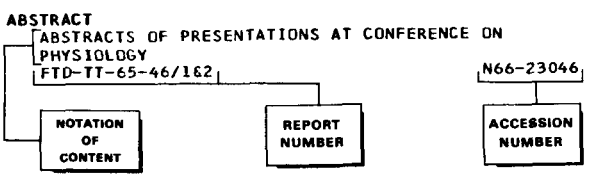
A66-82403
RESPONSES OF SOME ANOMURAN AND BRACHYURAN CRUSTACEANS TO HIGH-SPEED CENTRIFUGATION.
Walter Abbott and C. E. Dawson (Gulf Coast Res. Lab., Ocean Springs, Miss.).
Nature, vol. 211, Sep. 17, 1966, p. 1320–1321.
Gulf Coast Res. Lab. supported research.

Anomuran crustaceans (*Pagurus floridanus* and *Clibanarius vittatus*) were highly tolerant to centrifugation of 800–2700 g. Brachyuran crustaceans (*Sesarma reticulatum* and *Uca* sp.) were notably less resistant to the same centrifugal forces.

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / *a continuing bibliography* JANUARY 1967

Typical Subject Index Listing



A Notation of Content, rather than the title of the document, appears under each subject heading; it is listed under several headings to provide multiple access to the subject content. The accession number is located beneath and to the right of the Notation of Content, e.g., N66-12345. Under any one subject heading, the accession numbers are arranged in sequence.

A

B

C

D

E

F

G

H

I

M

N

P

R

S

U

W

X

Y

Corporate Source Index

Typical Corporate Source Index Listing

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
VISUAL FIXATION AND UNCERTAINTY EFFECTS ON HUMAN REACTION TIME AT CONTROL PANEL
AMRL-TR-65-149 N66-21110

A Notation of Content, rather than the title of the document, appears under each corporate source. The accession number is located beneath and to the right of the Notation of Content, e.g., N66-12345. Under any one corporate source, the accession numbers are arranged in sequence.

A

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
EFFECTS OF SPACE SUIT PRESSURIZATION AND WEIGHTLESSNESS ON PERFORMANCE DECREMENT IN SPACE MAINTENANCE ACTIVITY
NASA-CR-78433 N66-38115

DISC ELECTROPHORESIS FOR FRACTIONATING SERUM PROTEINS AND ENZYMES
AMRL-TR-65-202 N66-39798

OPTIMUM ANGULAR ACCELERATIONS FOR CONTROL OF REMOTE MANEUVERING UNIT WITH TELEVISION CAMERAS
AMRL-TR-66-20 N66-39846

AEROSPACE MEDICAL DIV. ARCTIC AEROMEDICAL LAB., FORT WAINWRIGHT, ALASKA.
CARDIOVASCULAR EFFECTS OF MILD SURFACE COOLING IN NORMOTHERMIC DOGS CROSS CIRCULATED WITH HYPOTHERMIC DOGS
AAL-TR-66-1 N66-38167

HEMODYNAMIC AND METABOLIC RESPONSES OF INFUSED LOW MOLECULAR WEIGHT DEXTRAN
AAL-TR-66-9 N66-39858

AEROSPACE MEDICAL DIV. PERSONNEL RESEARCH LAB. /6570TH/, LACKLAND AFB, TEX.
SELECTION, TRAINING, AND UTILIZATION OF MILITARY PERSONNEL - BIBLIOGRAPHY AND ABSTRACTS
PRL-TR-65-23 N66-38220

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
REACTIVITY OF ADRENARGIC AND CHOLINERGIC RECEPTORS IN ACUTE RADIATION SICKNESS
FTD-TT-65-941 N66-38485

BIOELECTRIC INSTRUMENTS AND DEVICES AS CONTROL SIGNALS IN MEDICAL INVESTIGATIONS, DIAGNOSES, AND THERAPEUTICS
FTD-TT-64-1019 N66-38739

CORRELATION FUNCTIONS CALCULATED FOR CARDIOVASCULAR SYSTEM REACTIONS OF COSMONAUTS DURING FLIGHT OF VOSKHOD SPACECRAFT N66-38995

WATER EXCRETION FUNCTION OF KIDNEY AND ENDOCRINE SYSTEM EXAMINED IN COSMONAUTS OF VOSKHOD SPACECRAFT N66-38996

PSYCHOPHYSIOLOGICAL MECHANISM OF MAN FOR ORIENTATION ANALYZED UNDER CONDITIONS OF GRAVITY AND WEIGHTLESSNESS - VOSKHOD II SPACECRAFT N66-38997

CONDITIONED RESPONSE AND HYPNOSIS IN MEDICAL THERAPY FOR DERMATITIS
FTD-TT-65-1981 N66-39342

HYPNOSIS, ITS HISTORY, AND RELATION TO PHYSIOLOGY AND PSYCHIATRY N66-39343

ELECTRIC SLEEP AND HYPNOSIS IN DERMATOLOGY N66-39344

RADIO TRANSMISSION SYSTEM FOR RECORDING HEART AND PULSE RATE
FTD-TT-65-1710 N66-39467

ANTIOCH COLL., YELLOW SPRINGS, OHIO.
STUDY OF ONE-HANDED LIFTING BY HUMANS
AMRL-TR-66-17 N66-39850

ATOMIC ENERGY COMMISSION, WASHINGTON, D. C.
PAPERS FROM CONFERENCE ON RADIOACTIVE PHARMACEUTICALS
CONF-651111 N66-39421

B

BATTELLE-NORTHWEST, RICHLAND, WASH.
FORMATION OF LONG-LIVED ORGANIC RADICALS IN IRRADIATED AQUEOUS SOLUTION
BNWL-SA-712 N66-38628

BIOSYSTEMS, INC., CAMBRIDGE, MASS.
PHYSIOLOGICAL, BEHAVIORAL, AND CONTROL INVESTIGATION OF RAPID SACCADIC JUMP EYE MOVEMENT IN HUMANS
NASA-CR-564 N66-37775

CRITICAL REVIEW AND EVALUATION OF BIOLOGICAL CONTROL SYSTEMS IN HUMANS
NASA-CR-577 N66-37776

C

CALIFORNIA UNIV., LOS ANGELES.
INTRINSIC ORGANIZATION OF CEREBRAL TISSUE IN ALERTING, ORIENTING AND DISCRIMINATIVE RESPONSES
NASA-CR-78880 N66-39697

STUDY OF RENAL LYMPH FLUID TRANSPORT SYSTEM
NASA-CR-78876 N66-39701

REVIEW OF PUBLISHED LITERATURE ON URINARY REFLUX
NASA-CR-78877 N66-39702

CAMBRIDGE UNIV. /ENGLAND/.
VISUAL CONSTANCY DURING ACCELERATED OBSERVER MOVEMENT, STEREO INDICATOR OF MOVEMENT, AND MEASUREMENT OF APPARENT DEPTH IN VISUAL PERCEPTION STUDIES
AFOSR-66-1532 N66-39655

CARNEGIE INST. OF TECH., PITTSBURGH, PA.
DISEMINER - DISTRIBUTIONAL-SEMANTICS INFERENCE MAKER SYSTEM IN ALGOL LANGUAGE
AD-636380 N66-38201

CASE INST. OF TECH., CLEVELAND, OHIO.
HUMAN PHYSICAL CAPABILITY DURING SIMULATED LUNAR GRAVITY CONDITIONS

D

E

F

G

H

I

J

K

L

M

N

O

P

R

S

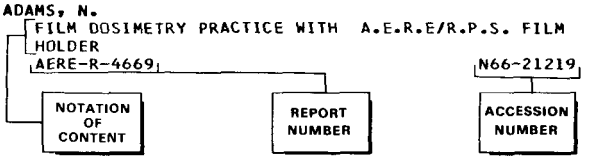
T

U

W

Personal Author Index

Typical Personal Author Index Listing



A Notation of Content, rather than the title of the document, appears under each author's name. The accession number is located beneath and to the right of the Notation of Content, e.g., N66-12345. Under any one author's name, the accession numbers are arranged in sequence.

A

B

C

D

E

F

G

H

K

L

M

Q

R

S

T

U

V

W

Y

Z

NASA-Langley, 1967

Collections of NASA Documents

NASA is depositing its technical documents and bibliographic tools in eleven Federal Regional Technical Report Centers. Each Center, located in the organizations listed below, is prepared to furnish the general public such services as personal reference, inter-library loans, photocopy service, and assistance in obtaining retention copies of NASA documents.

California: University of California, Berkeley
Colorado: University of Colorado Libraries, Boulder
District of Columbia: Library of Congress
Georgia: Georgia Institute of Technology, Atlanta
Illinois: The John Crerar Library, Chicago
Massachusetts: MIT, Cambridge
Missouri: Linda Hall Library, Kansas City
New York: Columbia University, New York
Pennsylvania: Carnegie Library of Pittsburgh
Texas: Southern Methodist University, Dallas
Washington: University of Washington Library, Seattle

In addition, NASA publications are currently being forwarded to the public libraries in the cities listed below:

Alabama: Birmingham
Alaska: Anchorage
Arizona: Phoenix
Arkansas: Little Rock
California: Los Angeles, Oakland, San Diego, San Francisco
Colorado: Denver
Connecticut: Hartford, Bridgeport
Delaware: Wilmington
Florida: Miami
Louisiana: New Orleans
Maryland: Enoch Pratt Free Library, Baltimore
Massachusetts: Boston
Michigan: Detroit
Minnesota: St. Paul
Missouri: Kansas City, St. Louis
New Jersey: Trenton
New York: New York State Library, Brooklyn, Buffalo, Rochester
North Carolina: Charlotte
Ohio: Cleveland, Cincinnati, Dayton, Toledo
Oklahoma: Oklahoma City
Pennsylvania: Pittsburgh
Tennessee: Memphis
Texas: Fort Worth, San Antonio
Washington: Seattle
Wisconsin: Milwaukee

An extensive collection of NASA and NASA-sponsored scientific and technical publications available to the public for reference purposes is maintained at the Technical Information Service, American Institute of Aeronautics and Astronautics, 750 Third Avenue, New York, New York, 10017.

"The aeronautical and space activities of the United States shall be conducted so as to contribute . . . to the expansion of human knowledge of phenomena in the atmosphere and space. The Administration shall provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."

—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

NASA SCIENTIFIC AND TECHNICAL PUBLICATIONS

TECHNICAL REPORTS: Scientific and technical information considered important, complete, and a lasting contribution to existing knowledge.

TECHNICAL NOTES: Information less broad in scope but nevertheless of importance as a contribution to existing knowledge.

TECHNICAL MEMORANDUMS: Information receiving limited distribution because of preliminary data, security classification, or other reasons.

CONTRACTOR REPORTS: Technical information generated in connection with a NASA contract or grant and released under NASA auspices.

TECHNICAL TRANSLATIONS: Information published in a foreign language considered to merit NASA distribution in English.

SPECIAL PUBLICATIONS: Information derived from or of value to NASA activities. Publications include conference proceedings, monographs, data compilations, handbooks, sourcebooks, and special bibliographies.

TECHNOLOGY UTILIZATION PUBLICATIONS: Information on technology used by NASA that may be of particular interest in commercial and other nonaerospace applications. Publications include Tech Briefs; Technology Utilization Reports and Notes; and Technology Surveys.

Details on the availability of these publications may be obtained from:

SCIENTIFIC AND TECHNICAL INFORMATION DIVISION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D.C. 20546